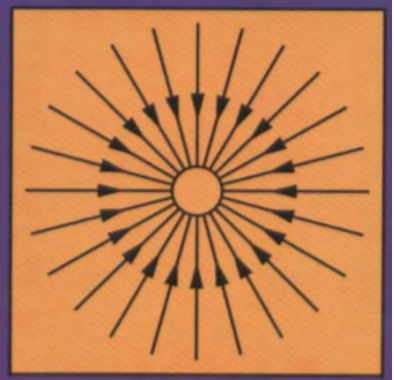
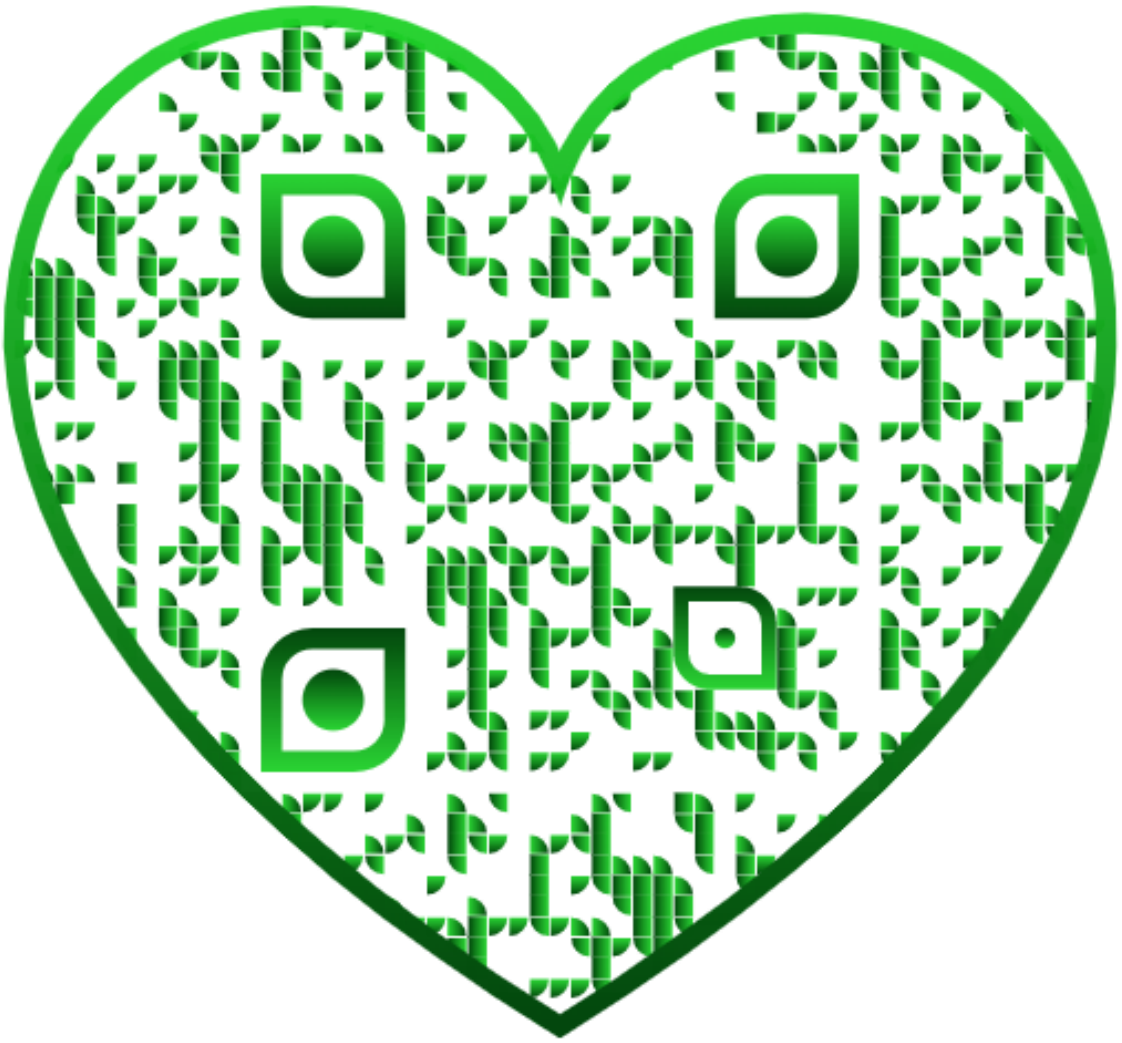
PHYSICS OF FREE POWER GENERATION

(BEYOND MATTER)



PARAMAHAMSA TEWARI



"The universe must be dynamic and possess movement"? Isn 't this another way of stating the content of Einstein's 1917 and still standard geometric theory of gravity, according to which the geometry of space is a dynamic entity, changing from instant to instant according to an utterly simple and beautiful law? It is an honour and pleasure to be associated with you in the considerations of these deep and wonderful questions" Feb. 1985.

John Archibald Wheeler
Nobel Leureate

ABOUT THE AUTHOR

Paramahamsa Tewari, (b.1937) B.Sc. Engineering, is Executive Director, Nuclear Projects, India. He framed a hypothesis, in mid-seventies, on generation of cosmic matter from the space medium, and has lectured worldwide on "space vortex theory" and "phenomenon of Space Power Generation" at over-unity efficiency.

PREFACE TO THE SECOND EDITION

This work (1983) is the fourth in series, preceded by "The Substantial Space and Void Nature or Elementary Material Particles"(1977), "Space Vortices of Energy and Matter"(1978) and "The Origin of Electron's Mass, Charge, Gravitational and Electromagnetic Field from "Empty" Space"(1982). The basic idea, of constructing the universe of matter and the medium of space with a single mobile entity (fluid substance), was first formulated as a hypothesis in my work (1977), which was further developed in other works, referred above, without any change in either the basic postulates or the main framework of the hypothesis, though the mathematical analysis underwent constant improvements in the subsequent works. For the mathematical clarity, the reader may refer to this work, "Beyond Matter", whereas, for the progressive development of the ideas of spatial reality going through the earlier works too will be useful, specially, for the qualitative aspects of the generation of the fundamental phenomena of mass, inertia and charge.

The experimental proof of the hypothesis of the substantiality of space has been subsequently obtained through the numerous experiments on a new phenomenon of "space power generation", that are discussed and reported elsewhere. The positive results of these experiments had given me the added conviction to name the earlier hypothesis as "Space Vortex Theory", abbreviated as SVT.

There is hardly any deviation from the earlier theme. The nature of space and elementary particle of matter, conceived by me about two decades ago, remain unaltered even today.

PARAMAHAMSA TEWARI
(1996)

PREFACE TO THE FIRST EDITION

Howsoever naive I may appear, specially because of being a non- professional in the field of Physics, I cannot but assert my conviction that space is the most basic reality of the universe, existent eternally as a "dynamic plenum" which generates matter through the fields and the forces created due to its own characteristic motion.

It is true that 'absolute space','absolute motion', and 'absolute rest' are undetectable experimentally, but that is because, so far, a theory on the basic structure of matter has not been developed, and experiments are being performed with the scientific apparatus to detect the absolute-space and absolute motion, while not recognizing the fact that the particles of matter, that constitute the appartus, have their origin from the absolute space-motion that forms their structure. Matter is the secondary effect of the most fundamental and primary motion of the absolute space.

The modern physical research is continuing on the identification of the fundamental particle/particles, that can assemble matter, and the determination of the basic field/fields that construct these particles. In the subsequent and the final stage, the exploration will center on the origin and the creation of the fundamental field itself. It is at this limiting stage, when the agency for the creation and the eternal existence of the fundamental field will be investigated, Physics shall reach an impasse if it does not take note of the reality of space, which alone can generate the fundamental field. It is the sub-quantum phenomena, to which the Physics is now reaching in this century, that demand deeper exploration on space properties and material structure.

An utter simplicity is evident at the fundamental stage of creation of universal matter. The complexities, in understanding the basic structure of matter and space, are concluded to be due to the current premises of 'emptiness' of space and 'concreteness' of particles of matter being opposed to the actual reality in the design of the universe. There is another handicap which is indeed serious in the formulation of a new theory of space and matter. The concept of "mass" is ingrained so deeply in our thought, that to imagine a massless entity seems to be an absurdity at the face of it. It is so, because "mass" produces momentum, kinetic energy, and the gravitational force, which have concrete influence on our experiences. The electric and magnetic forces too have their origin form electron which, in addition to the charge that produces the electromagnetic effects, has the property of mass also. However, to determine the very origin of mass and other effects that arise from it, a "massless" entity will' have to be conceived.

Any argument, scientific or philosophical, that seeks to negate the reality of space, must provide an alternate agency which can generate the basic properties that quantum matter, say, the electron, exhibits. It is only when the behaviour of matter is studied in totality, investigating the process of its creation and also the 'whys' of its fundamental properties, that the reality of space will become evident.

PARAMAHAMSA TEWARI

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CHAPTER-ONE

EVOLUTION OF BASIC CONCEPTS

1.1 The Mechanistic view in Newtonian Mechanics:

In the classical mechanics of Newton, the physical reality of the universe centered on material-points (mass-points) and the force acting on them in absolute space which was considered to be three-dimensional, Euclidean and at rest. The matter consisted of hard, solid particles that attracted each other through the intervening emptiness of space due to some mysterious gravitational force, the agency of which remained unknown. Newton also formulated the laws of motion with principle of inertia, and with these laws and the gravitational force, he explained the orderly motion of the cosmic bodies. Despite the fact that the fundamental nature of mass, inertia and gravitation, remained obscure, and the reason for the "action at a distance" could also not be understood, the Newtonian mechanics did still have a great success in explaining more and more phenomena of astronomy, and in extension of its application to motion of liquids, theory of heat, etc. The mechanistic view of nature, in which only the material points and the forces acting on them seemed to constitute the entire physical reality[1] of the universe, got strengthened with the success of the classical mechanics of Newton.

1.2. "Field" as the basic element of force:

In the 19th century, while studying electric and magnetic phenomena, Faraday and Maxwell introduced a revolutionary concept of "field" which proved to be more basic entity than the

1. The term 'reality' is qualitatively defined as the basic state of universal energy.

Newtonian force.(The concept of "force field" is generally applied to electrostatic, magnetic, electromagnetic and also gravitational phenomena. Though the nature of electric and magnetic forces of electrodynamics, with regard to their origin, is different from the gravitational force of Newton, yet the concept of "force field" of Faraday is taken here as common to the gravitational as well as electromagnetic force). The force could be split-up into two physical quantities, one of them being invariably a field. It thus got revealed that field is more elementary in nature representing a physical reality, more basic than force, and with this distinctiveness of field, a deeper insight into the fundamental nature of force could be had.

1.3. "Force Field" concept transferred the physical reality from "force on a material-point" to "field distribution in space medium"

While the Newtonion force acted on a material (mass) point, the fields arising from a point-source of matter like a mass, or a source of charge, were distributed at each point in the whole of space, with continuous variation, such that, by placing another material source of field at any point in space, a corresponding force at that point could be produced. In qualitative terms, the physical reality was spread out through the field in the whole of space rather than remaining confined to an ultrasmall limited zone of a material-point with a force or a set of forces acting on it. The following inquiries that centre on the physical reality of space would, consequently, assume paramount importance.

(i) Just as a "field" is seen to be a more basic state of reality than "force", is there a fundamental state of reality which is more basic than the "field" itself ?

(ii) Since the fields are of different kinds, can the space medium not fulfill the requirement of a common unifying substratum of physical reality which, in its different characteristic states of energisation, motion, deenergisation etc., can create, sustain and transmit all kinds of fields?

(iii) If (ii) above is true, then, what are the basic properties of space medium either in terms of known properties of matter, or even radically different from it, for it shall cause a severe restriction in the development of a basic theory of space, energy and matter, to presuppose that space must necessarily possess properties akin to matter.

(iv) Since "field" is a basic element common to both the forces (that it can produce) as well as the field-sources of matter(that produce the field), a deeper study of the fundamental nature of the field that constitutes the material-point of Newton is basically essential for the development of a universal theory of matter.

(v) The elementary field in the constitution of material-point, as in (iv) above, should be so distributed, that the basic nature and agency of mass, inertia and gravitation, as introduced by Newton in classical mechanics, are fundamentally understood. Similarly, the nature and agency of charge (of electron, discovered by the close of 19th century), the "positive" and "negative aspects of charge, as introduced in electrostatics and electrodynamics, would also require explanations from the basic structure of material point. A theory on the physical structure of matter must necessarily incorporate, side by side, the above two main and fundamental aspects of behaviour of matter, which provide the foundations to the classical mechanics and the electrodynamics.

1.4. 19th century efforts to show that aether is the basis of the only basic physical reality of the universe.

By the close of the 19th century, the above issues would have been the main considerations to determine the nature of aether that was earlier introduced by Descartes in order to explain the gravitational force involving "action at a distance", and also to provide a theory of matter. (It is the unifying aspect of

aether that can produce forces as well as the very basic substance for matter that merits critical examination.) The physical reality of space medium was required not only for the propagation of light, but to account for a very wide range of fundamental phenomena. In the year 1899, Michelson had, in one of his lectures, expressed, "suppose that an aether strain corresponds to an electric charge, aether displacement to the electric current, aether vortices to the atoms; if we continue these suppositions, we arrive at what may be one of the grandest generalisation of modern science, namely that all the phenomena of the physical universe are only different manifestations of the various modes of motion of one all pervading substance, the aether. The day seems not too far distant when the converging lines from many apparently remote regions of thought will meet on some common ground. Then the nature of the atom and the forces called into play in their chemical union, the interactions between these atoms and the non-differentiated aether as manifested in the phenomena of light and electricity, the structure of the molecule, the explanation of cohesion, elasticity and gravitation, all these will be marshalled into a single compact and consistent body of scientific knowledge."

1.5. Special theory of Relativity, at the start of this century, discarded aether but recognised fields

The aether by the close of the 19th century could not be assigned with definite basic properties, and sometimes, the explanations to certain phenomena required aether properties that contradicted each other. In Einstein's own words[2] against aether hypothesis (though expressed in his paper published as late as 1950). "Since the field exists even in vaccum, should one conceive of the field as a state of a carrier or should it rather be endowed with an independent existence not reducible to anything else. In other words, is there an aether which carries the fields,

2. On the generalised Theory of Gravitation By A.Einstein, Scientific American, April 1950 Vol. 188 No. 4 pp. 13-17.

the aether being considered in the undulatory state for example; when it carries light waves? The question has a natural answer. Because one cannot dispense with the field concept, it is preferable not to introduce in addition a carrier with hypothetical properties. However, the path finders who first recognised the indispensability of the field concept were still too strongly imbued with the mechanistic tradition of thought to accept unhesitatingly this simple point of view. But in the course of following decades this view imperceptibly took hold."

There is a lurking danger in rejection of the very existence of an entity if it happens to be more basic than the phenomenal effect for the preference of which the basic entity is rejected. For instance, in classical mechanics, to recognise the physical reality of momentum which is obtained as a product of mass and velocity and to reject the very existence of mass, would be a folly, since, comparatively mass is a more basic property of matter, in the sense , that there can be a body of a definite mass and zero velocity, which will, therefore, have zero momentum. Einstein, through Special Theory of Relatively, was himself not proposing a physical theory of matter, and was also aware on the limitations of electrodynamics to provide a comprehensive and basic theory of material point. His concern , through his relativity theory, appears to be to analyse some universal phenomena through a novel approach.. Under such a view of nature, which gets restricted by not incorporating a basic theory of matter, a proposal for the rejection of aether the existence of which was being debated since centuries, and which was considered, as basic and universal an entity as the substratum or the universal space itself, can indeed be considered rather hasty.

The many unresolved and fundamental issues, arisen by the end of the 19th century, and which the aether theories were expected to answer, covered much wider phenomena than the above view of Einstein which seems to limit aether's function to act only as a "carrier" to the field. If, however, a universal

elementary field is indeed discovered and shown to construct the material-point of Newton and the point-charge of electrodynamics, and also be able to produce the fields in space and the associated effects of mass and charge as experimentally observed, the aether can as well be replaced by this basic universal field. There were larger issues at stake in rejecting altogether the existence of aether, specially because, by the end of the 19th century, little knowledge was gained on material (atomic and nuclear) structure. Out of the two physical realities of Newton, namely, the material point and the force, while the force was developed to a more basic concept of field, the material point was yet to be fully explored at the start of this century when the Special Theory of Relativity branded aether of space as a superfluous entity.

Einstein's effort to find a unified base for mechanics as well as electrodynamics through Special Theory of Relativity brought about a major change by demolishing the basic foundations of absolute space and time on which the Newtonian mechanics was erected. It would, however, be seen below that without demolishing the basic structure of traditional concepts of space,[3] time and simultaneity, the unification of classical mechanics and electrodynamics and the fields and the forces can be done in the very structure of the fundamental matter.

1.6. Limitations of Electrodynamics of Maxwell

In the absence of theory of matter, Einstein points out further in the paper referred above, "Maxwell's theory, although adequately describing the behaviour of the electrically charged particles in their interaction with one another, does not explain the behaviour of electrical densities i.e. it does not provide a theory of particles themselves. They must therefore be treated as mass points on the basis of the old theory." There is, however, a very serious difficulty in "point" concept of matter. If an electron

3 The traditional concept of inert space of classical mechanics has however undergone revision in this work.

is treated as a point charge, it would posses in its spatial fields an infinite amount of energy which indeed is an absurd result. In addition, there is further inconsistency with mass-point model of particles as argued in the same paper by Einstein. "The combination of the idea of continuous field with that of material point discontinuous in space appears inconsistent. A consistent field theory requires continuity of all elements of the theory, not only in time but also in space and in all points of space. Hence the material particle has no place as fundamental concept in field theory. Thus even from the fact that gravitation is not included, Maxwell's electrodynamics cannot be considered a complete theory." The new physical theory of matter must remove the above inconsistency, bringing about the unification of the spatial fields with the particle structure while yet overcoming the difficulty associated with the point concept of matter. The challenge can be met by adopting an entirely new approach as discussed below.

1.7. A new approach to material point

The inconsistency between the "continuous field" and "discontinuous material-point", as pointed out by Einstein in the middle of this century, is real till date and the most fundamental issue to be considered in the development of basic theory of matter. A clue towards a new hypothesis can be had by arguing with the following basic considerations.

(i) The concept of variation of field continuously in space being more elementary than the force acting on a material point, as in classical mechanics, the physical reality of the ideal "zero radius point" concept of matter can be sacrificed in favour of the physical reality to the spatial fields. In other words, the reality (energy content) of a material-point should be considered to be inherent in its spatial fields which need not start from zero radius, that is, from the geometrical center of the material point.

(ii) The evasion of the difficulty from the infinite field energy associated with a point-charge(electron) can be had by breaking down the fields within a definite ultrasmall fieldless spherical

zone concentric with the geometrical centre of electron, while yet retaining the continuity of the fields in the rest of the space and also around the fieldless zone (fig. 1.1).

(iii) The fieldless spherical zone concentric with the centre of electron should account for the basic properties exhibited by matter, like mass, inertia, creation of charge and associated fields and their effects as outlined earlier. The ultrasmallness of the fieldless spherical zone would yet behave like a 'point' in its interaction with the external fields and material- particles.

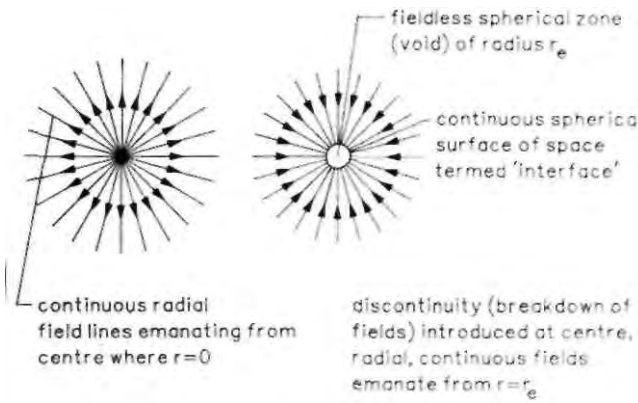


Fig. 1-1.

(iv) The discontinuity introduced by the fieldless zone should however be so ingeniously accounted that the continuity of all the starting point of the fields around the fieldless sphere remains maintained through the medium of space forming the spherical surface. (fig.1.1).

(v) With the introduction of the fieldless zone, the process of creation of matter would be to describe the conditions that create the fieldless zone and consequently the fields. Similarly the collapse of the fieldless zone and the associated fields will account for the process of annihilation of matter.

1.8. Introducing a fieldless void at Electron Centre

The introduction of an ultrasmall fieldless zone at electron centre will necessitate the following new definitions of space and matter that make sharper and precise distinctions among the terms like, 'empty-space', 'absolute vaccum', 'matter' and 'void'. Refer Fig.1.2.

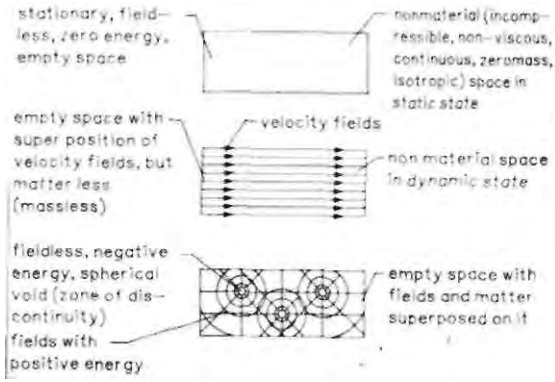

stationary, field-less, zero energy, empty space
non-material (incompressible, non-viscous, continuous, zero-mass, isotropic) space in static state
empty space with super position of velocity fields, but matter less (massless)
velocity fields
non material space in dynamic state
fieldless, negative energy, spherical void (zone of discontinuity)
fields with positive energy
empty space with fields and matter superposed on it

Fig. 1-2.

Matter

The medium composed of an assembly of entities, each with its own specific geometrical centre, and possessing rest-mass, inertia, electric-charge (in certain conditions) and their associated fields.

Space (Absolute vacuum and empty space)

The continuous medium which has no matter (as defined above) within the volume considered, but may have fields produced by matter located outside the considered volume, or fields produced due to dynamic state of the absolute vacuum itself. The absolute vacuum free of matter shall also be referred

to as space. The term 'empty space' will however signify 'that state' of absolute vacuum or space which has neither matter nor fields produced either due to its own dynamic state, or due to matter located outside the considered volume'.

Void

An ultrasmall spherical zone of a fixed radius concentric with the electron centre, which does not possess space medium and therefore cannot generate or sustain any kind of field within its sphere. Since the points in space (absolute vacuum and empty space) can sustain fields, they are physically real points. However due to the impossibility of the creation of the fields within the void, the points there have only imaginary geometrical positions with no physical reality. A void is a fieldless 'hole'or a 'cavity' in the real medium of space where the 'real medium' signifies the medium that can sustain fields and can, conse-quently,possess. energy.

With the above definitions, a sharper distinction between the terms 'empty space' and 'void' has been made. The definite volume of the fieldless void at electron's centre has also replaced the material-point with highly condensed distribution of energy as conventionally supposed. A material medium consists of empty space (of which the basic properties are discussed further) on which matter with fixed void content in each of its entities, and the fields arising therefrom, are superimposed. There is, thus, no empty space (as defined above) left in a material medium, though, there is a fieldless void in each particle that in multiple assembly constitutes matter. Due to the presence of enormous matter and extending into the farthest depth of space, there can be no empty space anywhere in the universe, however, each electron will contain a definite size of a fieldless void at its centre under the proposed new theory which distinguishes between the media of space, matter, 'fieldless empty space' and void.

The above new definitions of the basic terms related with space, energy and matter are essential for further analysis in this work in view of the lack of sharp distinction among these basic phenomena presently as is evident from Erwin Schrodinger's observation,[4] "Today a physicist no longer can distinguish significantly between matter and something else. We can no longer contrast matter with forces or fields of force as different entities. We know now that these concepts must be merged. It is true that we speak of 'empty ' space (i.e.space free of matter), but space is never really empty, because even in the remotest voids of the universe there is always starlight and that is matter. Besides space is filled with gravitational fields and according to Einstein gravity and inertia cannot very well be separated."

The "empty space" referred to in the above quotation signifies "Space free of matter", whereas, as per the definitions provided earlier, "empty space" is defined as a "matterless and also fieldless volume of space". Also in the above quotation, no distinction between 'void' and 'empty space' has been made in addition to the prevalent lack of distinction between 'field' and 'matter' and 'inertia'. To establish clarity of concepts, with sharp distinctions among the fundamental phenomena, and suggesting their merger only at an appropriate stage, is the central feature of this physical theory on space, energy and matter.

1.9. A new approach to the properties of space

The insertion of the fieldless void at the electron's centre leaves the spatial fields as the only physical reality in the universe (Fig.1.1). The basic properties of space can now be inferred keeping an overall view of the fact that the phenomena of the spatial fields are left out as the sole agents to produce energy, matter and all of their effects. The fields in electron struc-

4. "What is matter"-by Erwin Schrodinger, Scientific American, September 1953, Vol.189, No.3 pp.52-57.

ture, as also shown in author's earlier works,[5] are produced in space due to the insertion of the central void, and the conditions required for the dynamic stability of the void. Some basic derivation in the above works are that:

(a) the rest mass of electron (m_e) is directly proportional to the product of the volume on its spherical void and the light speed,c, in absolute vacuum.

(b) the charge of electron (qe) is directly proportional to the product of surface on its spherical void and the light speed, c in absolute vacuum.

(c) the energy from within the spherical void during its creation is $m_e c^2$ and in a static electron, distributed as spatial fields of gravity and electrostatic, thus leaving the void fieldless and with a definite negative potential. It is these spatial fields of gravity and electrostatics that, during oscillation or motion of electron, appear as electromagnetic fields produced by electron.

(d) the dialectric constant ε_0 of the absolute vacuum is inversely proportional to the light speed c in absolute vacuum.

(e) the Planck's constant h, is directly proportional to the product of rest-mass of electron, void radius r_e and light speed.

The important inference from (a), (b) and (c) above is that since the void, associated with its gravitational and electrostatic fields in space, accounts for the mass, inertia, and electromagnetic property of the electron, the medium of space, or the spatial field of electron, is not required to possess either mass or density (mass per unit volume). The basic concept of "massless"

5. (i) The Substantial Space and Void-nature of Elementary Material Particles (1977), (ii) Space Vortices of Energy and Matter (1978) (iii)The origin of Electron's Mass, Charge, Gravitational and Electromagnetic Fields from the Empty Space (1982), and (iv) Space is the Absolute Reality (Proceedings of International Conference of Space Time Absoluteness, Genoa,8-11 July, 1982.

and 'densityless' space of primary reality is the distinguishing feature of the Space Vortex Theory (hereafter, abbreviated as SVT).

The universal space in its basic state is three dimensional, Euclidean, massless and densityless.

As defined before, the fieldless-void does not contain within it any real point. The continuity of the space-points and the fields on them will, therefore, have to be continued only upto the spherical interface (Fig. 1.1). A continuous spherical boundary (referred above as 'interface') of the physically real space- points enclosing the void is needed. This necessitates that the neighboring space points on the interface are in complete continuity. The fields will have maximum strength at the interface, the magnitude falling off continuously away from the void. Since the fields are recognised as the elementary state of the physical reality, their continuous variation in space, as observed, leads to the positive inference that space itself should be continuous. We can thus conclude that:

Space is a continuous substratum.

The inconsistency between the continuous field and the discontinuous material point, as pointed out by Einstein, will stand resolved with the continuous space and the 'fieldless' sphere of void' in electron structure , since, as stated before, at the interface there is a complete continuity of the space points. In an empty space volume, the absence of void signifies the absence of mass proportionate to the volume of the void. Since mass is directly proportional to the density, the very concept of 'density' will not be applicable to space (empty space, absolute vacuum). The concept of 'density' will, however, be applicable only to an assembly of voids, which, as discussed later, are shown to be present in each material media. These discrete voids may be either closely or loosely packed, thus imparting the property of 'density' to the material-media.Since the property of compressibility is dependent on the density of the particles of matter, the absence of mass and density in space removes the

compressibility concept from the basic space properties. Therefore, space is an incompressible medium.

A material entity like an electron, with void in its structure, can move freely in space medium. It would be, therefore, necessary that the physical reality of space should possess mobility as its basic property. A normal fluid is constituted of atoms and molecules (that as shown later possess voids) which, during motion, develop internal frictions anal shear forces. In a moving liquid, the shear stresses are described by viscosity, and are proportional to the velocity gradient v/d, as shown in Fig.1.3. Since space is continuous and does not possess mass and density, in its basic state(when the atoms and molecules are not yet created), it cannot develop viscosity. However in the limiting state of its flow,when the velocity gradient reaches the limiting value (light velocity / electron's void radius), as discussed further in Chapter-2 of this book, the flow of space breaks down into independent voids, leading to the formation of matter and, thus giving rise to the property of viscosity. Hence, in its basic state, space is a nonviscous fluid.

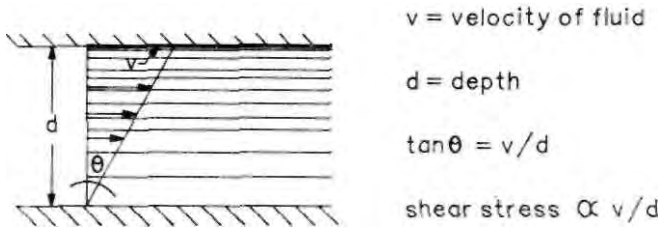


Fig. 1-3.

From the foregoing arguments, space is hypothesised to be continuous, incompressible, non-viscous, zero-mass and zero-density fluid. Since all these basic properties are unlike the properties of any material medium, the above non-material properties, assigned to space, do appear rather hypothetical. The

evolution of material properties from the substratum of space with non-material properties is an apparent contradiction, however, the very basic philosophy of SVT is to lay foundation on the most fundamental base, so that the inquiries on the basic properties of matter like mass, inertia, density, viscosity, compressibility, discontinuity, and charges with their effects, are pursued to the final depth, till the origin of these properties is traced and shown to emerge from the fundamental substratum of reality. With this approach, it will stand proved that the analysis has been carried right upto the truly basic state from where the material properties originate. Also , the unification of space and matter can be achieved by proving that space, in its various modes of motion and energisation, generates matter and its associated properties, which otherwise do not exist in static space. The generation of matter from non-matter (space), evolution of apparently 'concrete' material particles from the empty voids, unifying space and matter into a single universal physical reality of a primary spatial field (dynamic state of space), form the distinctiveness of the approach that has been possible to follow in the formulation of SVT, mainly because, the results of some crucial experiments of the 20th century have enabled probing into the structure of electron, which made possible the application of the alternative reasoning that could not have been otherwise applied before. For instance, one very important basis for introducing void in the electron structure is the discovery of positron in the thirties of this century, and the annihilation process while interacting with the electron. The discovery of the annihilation phenomenon should, in author's view, take us back to the pre- relativity and pre-quantum era which could not keep pace with the mathematical treatment of the quantum theory developments. Since the physical structure of the electron can vanish by emission of light while interacting with the positron, the possibility for the electron and positron to possess a 'hole' (void) structure which can collapse during annihilation is also an alternative and probable approach such that the eletromagnetic energy (light) released during annihilation is recovered by the

decay of spatial fields of the electron and positron. If the above is the reasoning pursued on the physical structure of electron, the 'hole' shall necessarily be embedded in a physically real medium of space, which would strengthen the case for some special kind of aether, that is, the 'aether' signifying the physical reality latent in space medium in the most basic state.

With the possibility of a dynamically stable physical model of electron more on classical lines(Fig.1.1) than on the modern quantum theory concepts, the true significance of the fundamental quantum quantity (Planck's constant) and the reasons for it to have physical relations with the classical concepts like angular momentum and magnetic moment of electron as discussed further would also be possible to grasp.

The discovery of the annihilation phenomenon should, thus, take the arguments on the nature of charge, mechanical-mass, electromagnetic-mass of electron, back in history to the aether era, and the dawn of Special Theory of Relativity and the quantum theory, specially because the fieldless void (at electron centre) embedded in space, shows enormous possibilities for the reestabltshment of the physical aspects of the quantum phenomena, and gives directions to build an alternate theory of existence-nonexistance of energy continuity-discontinuity of space medium, positive- negative potentials, as already foreseen by the philosophers in past, while also provides the basic link between the classical physics and the quantum theory through the classical treatment of h, m_e, q_e and c which are the keystones of the basic structure of the 20th century theories, and of which the real significance is still in obscurity.

1.10. Introducing new terms for sharper distinction between spatial and material effects

The space properties of continuity, zero-viscosity, zero-mass (zero-density) and incompressibility shall henceforth be grouped together and termed as 'non-material' properties. Also, in order to remind that the non-material space is the basic substratum of

reality (which will generate fields, energy and matter), a new term 'substantial space' (abbreviated as ss) shall be used for the medium of space wherever such an emphasis is required. The term 'substantial' applied to space will qualify the basic non material reality, and in this respect, will differ, hereafter, from the term 'physical' which will qualify the reality related only to the material particles and material media. In this sense the term 'substantial' is considered to be more primary than physical since in SVT, matter is generated form the non-material dynamic space. The term 'reality' shall, henceforth, signify the most basic state of universal energy latent in ss which manifests as spatial fields and matter as discussed in the ensuing chapters.

1.11. Limiting flow velocity of substantial space

One of the postulates in SVT is that the non-material ss can have a steady flow at different speeds varying from zero to the light-speed in absolute vacuum. The light-speed is postulated to be also the limiting speed of flow of ss. The main idea of imposing this limit on the flow of ss is for the creation of the voids when the limiting conditions of flow are reached.The transmission of electromagnetic field(light) at constant velocity c relative to ss substratum, irrespective of the motion of the source of light with respect to ss, is the basic concept adopted in this work. The effect of field transmission includes the speed of transmission of gravitational field also, thus leading to a general postulate as given in the following section that all the fields are transmitted in ss at constant speed c (relative to ss) and irrespective of the motion of the material sources (producing the field) relative to ss.

1.12. Some comments on Einstein's postulates of special theory of relatively (STR)

In his paper "On the electrodynamics of moving bodies", Einstein wrote....."light is always propagated in empty space with a definite velocity c which is independent of the state of motion of the emitting body.... The introduction of a "luminiferous ether"

will prove to be superfluous in as much as the view here to be developed will not require an "absolutely stationary space" provided with special properties, nor assign a velocity vector to a point of the empty space in which electromagnetic processes take place". Out of the two broad divisions of basic universal entities, namely, space, matter and fields, Einstein's above postulate recognises the dynamics of only the matter and fields, while space was assumed to be empty. The 'empty space' of Einstein, defined before, precisely as "Space without matter or fields", is a "zero energy state" of space substratum with zero velocity-vector at each of its point. Thus the 'empty space' of Einstein's Special Relativity, with the definitions of SVT, becomes the basic state of zero energy or a "specific condition" of space out of the many possible conditions in a generalised theory on dynamics of space (ss) presented here, in which space points are assigned with velocity-vector, and which as discussed below, can reveal the process of generation of universal fields and matter, whose fundamental nature and agency of creation have so far remained fully obscure in current physical theories including Special Relativity. Therefore, the necessity to assign velocity vectors to space points, and speculation on the fundamental properties of space in contrast to Einstein's approach, arises for the primary necessity of development of a basic theory of matter.

Einstein did not assume the existence of "luminiferous ether" in his postulate of Special Relativity referred above and even after a lapse of almost half a century from the formulation of this theory, he maintained the view (expresses earlier) on aether being superfluous. While in modern physics field is taken to be the fundamental concept which cannot be reduced to anything simpler, quite opposed to this view, it would be conclusively shown in this work that fields are indeed only the "characteristic states" of a 'carrier', and do not have independent existence apart from the 'carrier' and that all the fields are reducible to a more basic fundamental entity, which is the empty space substratum. Presently it is argued, that because of mechanistic point of view dominating physicist's thinking (late 19th Century and

early 20th Century), it was not readily accepted that an electromagnetic disturbance could be propagated in empty space, where 'empty space' signifies void). Such an argument can be considered provided the origin and the basic nature of the electromagnetic disturbance, with regard to its relation with space, is revealed to be such that it is independent of the fundamental existence of the empty space. If, however, the electromagnetic disturbance happens to be a produce of the empty space itself, where is the question of its creation and transmission in the absence of the empty space? Therefore, the recognition of the basic properties of continuity and mobility of empty space, as argued before, is not only for the purpose of introducing a 'carrier' for the transmission of fields, but also for a much more fundamental and broader issue, which is, the very generation of fields required for the creation of energy and matter as characteristic "dynamic states" of the empty space.

The other fundamental property of empty space, that has been vigorously debated specially after Einstein's relativity, is the velocity of light c in absolute vacuum. (The absolute vacuum is defined here as the empty space with zero matter and zero field and absolutely stationary in the sense that it is in a zero energy state due to zero velocity vector on each of its points). The Maxwell's equation used c as a fundamental constant, and its physical significance was the velocity of transmission of electromagnetic energy (including light) in a matter-free universal substratum and relative to it, at a speed of 3×10^{10} cm/sec, (the speed of light is exactly $c = 1/\sqrt{\mu_0 \varepsilon_0}$, where ε_0 is the dielectric
constant of the absolute vacuum, and μ_0 is the permeability constant of the vacuum). By the end of the nineteenth century, while the properties assigned to aether in many aether theories could not be confirmed experimentally, the property of aether as a substratum for electromagnetic transmission did indeed remain unaltered.

One of the main reasons for the failure of the detection of aether would certainly be, if it did possess non-material nature

as postulated above. The other reason for the substratum to remain elusive in various experiments (Michelson-Morley and others) would be the non-recognition of the dynamics of space, since the complex motion of space points around the earth, sun and the stars, and also in the interspaces of the cosmos (discussed later), shall interact with the electromagnetic field (light) deviating the course of a light-ray as per the principle of Galilean relativity. Therefore, for correct interpretation of the results of the experiments, performed to detect aether, dynamics of space would need to be taken into account. Postponing the discussion on the distribution of motion of universal space to a later stage in this work, Einstein's second postulate' of Special Relativity is first examined below.

The second postulate of Einstein states that light is always propagated in empty space with a definite velocity c, which is independent of the state of motion of the emitting body. In view of the earlier definition of the empty space in which the space points, in contrast with void, possess substantial reality, and also in the light of the properties assigned to empty space, the second postulate of Special Relativity will now convey the following significance.

(1) The velocity of light c is relative to the empty space substratum similar to the constant c used in Maxwell's equation, and

(2) The basic nature of light is unique that in contrast with Newtonian law of momentum conservation, it does not inherit the velocity of a moving source from which it is emitted in addition to its own natural transmission at c relative to empty space.

In further discussions on the fundamental nature of electromagnetic field (light), it would be shown that light is produced at a point in space when there is "decay" or reduction in the magnitude of fields (gravity field, electrostatic field) at that point, and that the effect of this decay is transmitted at constant speed irrespective of the motion of the light-source. (The light

velocity is independent of the velocity of its source is also proved by de Sitter's observation on double stars). Thus, Einstein's postulate on constancy of c confirms only the absolute property of the substratum of empty space that it transmits light at a constant speed c due to its fundamental characteristic property, and the true nature of light as to why it does not partake of the momentum of the source of light (demonstrated later) is to be clearly understood.

Also it is the lack of the precise definition of "empty space" "void" and "Absolute vacuum" that has shrouded the clarity of concepts on the fundamental nature of space and matter. For example, Einstein derives in Special Relativity the transformation of coordinates and time from a stationary system to another system in uniform motion of translation relative to the former. Now, since the empty space of Einstein, for important reasons given before, is now postulated as mobile, non-viscous and continuous, the relative motion of space points in a system of coordinates of one inertial frame will also set in motion the space of the preceding system of coordinates of the inertial frame assuming that there is no 'rigid' barrier of some kind between the two systems. In other words, uniform motion of space points of empty space of one inertial frame relative to the empty space of the other inertial frame is impossible, and consequently there remains only one universal inertial frame of 'dynamic empty space' in Special Theory of Relativity when mobility of empty space is postulated. Where is the question then of the transformation of coordinates and time in a single universal inertial frame of empty space? Whereas, if empty space is not distinguished from void (as in Special Relativity), and assuming that if matter still did somehow exist in void space, following Newton's first law of motion, a hypothetical material inertial frame of reference can indeed have uniform relative motion relative to another material frame of reference. However, in such a system, the void as defined above cannot have real points and can sustain no field (the electromagnetic field) which is to be measured in two frames of references as proposed in Einstein's Special Relativity. Also, since a hypothetical universal space, as an extension of

void, shall not produce a fundamental theory on the agency and origin of fields, energy, mass, inertia and charge, the 'void' cannot in reality replace the 'empty space' of the universe.

There is another basic difficulty with regard to the "Inertial" nature of the frame of reference. An inertial system is a frame of reference in which the law of inertia-Newton's first law- holds. From the structure of the fundamental mass discussed later in this book, it will be seen that inertia is a phenomenon exhibited due to the combined affect of void in the fundamental particle of matter and the mobility, zero-viscosity and continuity of the empty space. A void extension of universal space cannot make matter exhibit inertial property and hence there can be no inertial frame of reference in the universe of void space. The theory of matter discussed here will show that universal energy generated from the dynamic space creates universal matter, and hence there can be no existence of matter if the universal space itself is a void region.

1.13. Postulates

The basic aim of this theory being to generate electric charge, rest-mass, fields and other properties exhibited by matter, either due to its mass property (inertia, density), or discontinuous nature (compressibility, viscosity) from the dynamics of space itself, in the postulates below, the most fundamental state of space is hypothesised as a 'non-material' medium, where 'non- material', as defined before, signifies an incompressible, nonviscous, zero-mass, continuous and mobile substratum.

(A) The space of the universe is a non-material substratum of continuity, isotropy and mobility.

(B) The space has a maximum limiting linear velocity of flow equal to the light-velocity in absolute vacuum c, and a maximum limiting angular velocity, when in a state of circulating motion.

CHAPTER-TWO

GENERATION OF FUNDAMENTAL MASS AND FIELDS

2.1. Creation and Stability of Void

A circular irrotational vortex of space is shown in Fig. 2.1. The stream lines are concentric circles. The flow is steady due to which the velocity and acceleration of space points do not change with time. If this vortex pertained to a fluid which possessed a constant density, p, the element of fluid of volume, dAdr, will have a mass, ρdA dr. The two opposite accelerations, that balance on the element, are the outward centripetal acceleration and the inward net pressure force divided by the mass, It can be shown that in the irrotational vortex, ur = constant. In case of irrotational vortex of space, from postulate-A, P is zero, and hence there is neither a force which is proportional to mass, nor a pressure proportional to force acting inward on the element. The outward acceleration is no more balanced. On a streamline, the outward acceleration, u^2/r, acting simultaneously on diametrically opposite points, creates a tearing action tending to break down the space. When space points on a streamline with radius r_e, where r_e is the elementary length, reach the limiting angular rotation, ω, which is also equal to the maximum velocity gradient, c/r_e, (postulate B), the space breaks down into a spherical void of a definite radius r_e (Refer fig. 2.2 and fig. 2.3). The elementary length r_e is defined as the maximum possible radius of rotation of space point at the maximum tangential velocity c. The ratio of c and r_e is ω, where c and ω are the universal constants of postulate,-B.

Regarding stability of the void, the following considerations apply.

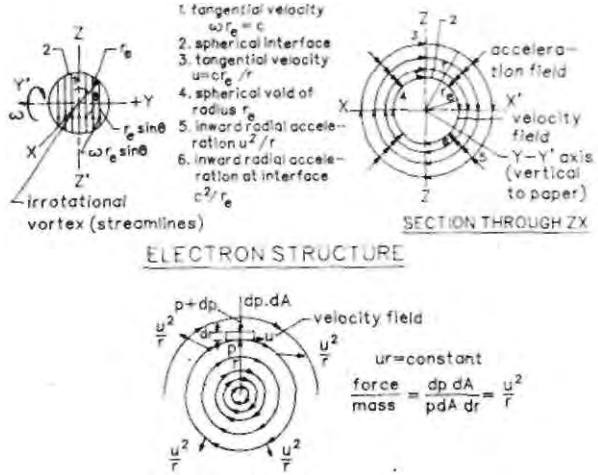


Fig. 2-1 Irrorational vortex

Since the space vortex is irrotational, ur = constant. In the transverse plane ZX in Fig. 2.3, the interface point z has, u = c, and r = r_e. Therefore at point z, cr_e = constant, and since, c = ωr_e, therefore, ωr_e^2 = constant. Any increase in r_e decreases ω. A decreased ω signifies a decrease in maximum possible velocity gradient c/r_e and due to this, void cannot be sustained. The void, therefore, shrinks back to its original radius r_e. Similarly, a decrease in r_e by an infinitesimal length dr, tends to increase c (which is not possible from postulate A), and also the velocity gradient, which becomes c/r_e - dr, that is greater than ω. The void is restored back to its original radius r_e thus maintaining the limiting velocity gradient c/r_e. The electron void has therefore a dynamic stability.

2.2. Generation of Fields

As discussed in Section 2.1, the velocity field u creates outward acceleration vector a_r, which is radial and has magnitude

u^2/r. The limiting value of a_r will be c^2/r_e. The breakdown of space takes place due to outward c^2/r_e at the limited velocity gradient c/r_e. As long as the space is not broken, the circulating space within the sphere of volume equal to the void, has positive energy (as defined later, the dynamic space is the fundamental state of positive energy). After the creation of the void, the positive energy from within the void is distributed in space as fields (discussed further), leaving the void fieldless and negatively energised. The negative potential within the void reverses the vectors on the interface which point radially inward following the void creation. Fig. 2.3 shows the velocity field and acceleration field in electron structure arising from the basic velocity field produced due to the circulation of space (Fig. 2.1).

Electronic charge and electrostatic field

In fig. 2.4, on the interface, consider an element of surface ds which possesses tangential velocity $u = \omega r_e \sin\theta = c\sin\theta$. The elemental electric charge on ds is defined as: $dq's = ds \times c\sin\theta$. The direction of dq's, being tangential to the element at surface, rotates a full circle when the integration for the charge on the interface is made. Therefore, it is the scalar value of the

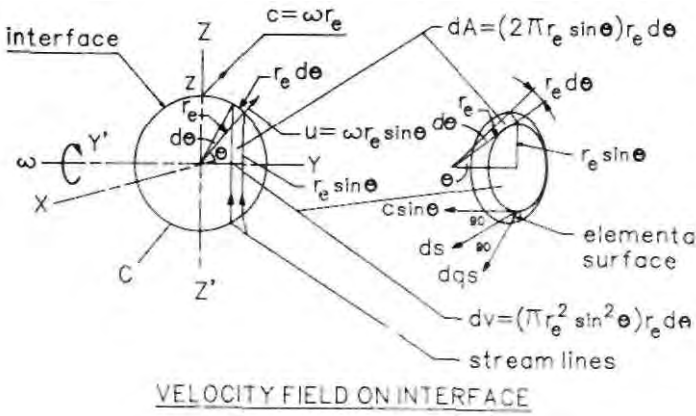


FIG. 2-4. Velocity field on interface.

charge dq's integrated on the interface that is of significance. The infinitesimal surface of the ring will have an area, dA = $2\pi r_e \sin\theta \, r_e \, d\theta$. The speed of rotation of a space point on the circular streamline on the elemental surface is $\omega \, r_e \sin\theta$. The electric charge, dq, on dA is defined as the surface integral of the speed of rotation of space points on it, that is:

$$dq = dA\omega r_e \sin\theta$$

Total charge on the spherical interface is the elementary electronic charge,

$$q_e = \int_0^{\pi} 2\pi c r_e^2 \sin^2\theta \, d\theta = (\pi/4)(4\pi r_e^2 c) \qquad (2.1)$$

The electronic charge is directly proportional to the product of the void surface and limiting speed c. The dimensions of q_e are $(\text{length})^3/\text{time}$. Since, as discussed before, void can be stable only as a whole sphere of fixed radius r_e, q_e is quantized, and fractional electronic charge is not possible.

The direction of spin (fig. 2.2) as seen by an observer on +Y axis and looking towards the void centre, makes the particle 'negatively' charged "electron", whereas, the opposite spin would be "positively" charged "positron". This definition of the nature of electron's charge determined by its spin direction is in conformity with the interaction of electron with external magnetic field and its sideways deflection as experimentally observed and discussed in Chapter 4. The mutual interaction of electron-electron, electron-positron, determined by the spin directions of their velocity fields and their superposition, are qualitatively explained in fig. 2.5. As seen in the figure, the space regions in between an electron and positron has intensified velocity fields. Since, in the irrotational vortex, ur = constant, the increased u, leads to a corresponding decrease of r, due to which the particles come together. The superposition of the velocity fields between the similar particles (same spin directions in the vortices) produces opposite effects. The quantitative measure of the forces is discussed below.

The velocity field (abbreviated as vf), at P (fig. 2.6) tangential to the circle C is, $cr_e \sin\theta/r$ which produces: an inward acceleration field along PO, $c^2 r_e^2 \sin\theta/r^3$. The radial component of this acceleration field, $a_r = c^2 r_e^2 \sin^2\theta/r^3$. The radial electric field E at p is identified to have the relationship $\frac{dE}{dr} = a_r$, from which,

$$E = -c^2 r_e^2 \sin^2\theta / 2r^2. \qquad (2.2)$$

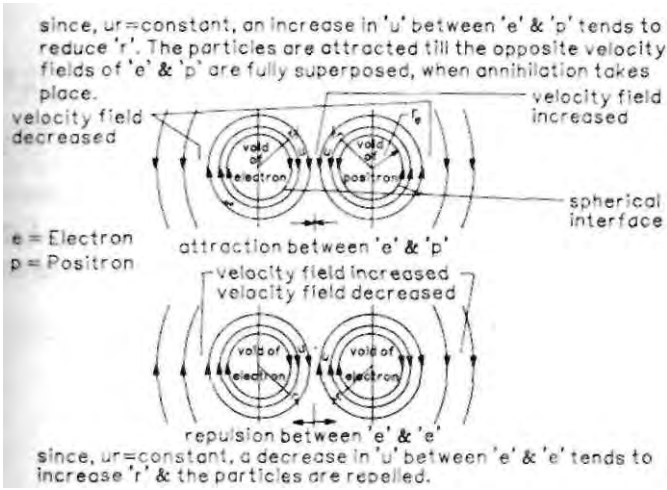

since, ur=constant, an increase in 'u' between 'e' & 'p' tends to reduce 'r'. The particles are attracted till the opposite velocity fields of 'e' & 'p' are fully superposed, when annihilation takes place.
velocity field decreased
velocity field increased
void of electron
void of positron
spherical interface
e = Electron
p = Positron
attraction between 'e' & 'p'
velocity field increased
velocity field decreased
repulsion between 'e' & 'e'
since, ur=constant, a decrease in 'u' between 'e' & 'e' tends to increase 'r' & the particles are repelled.

Fig. 2-5 Interaction of e & p through their velocity fields.

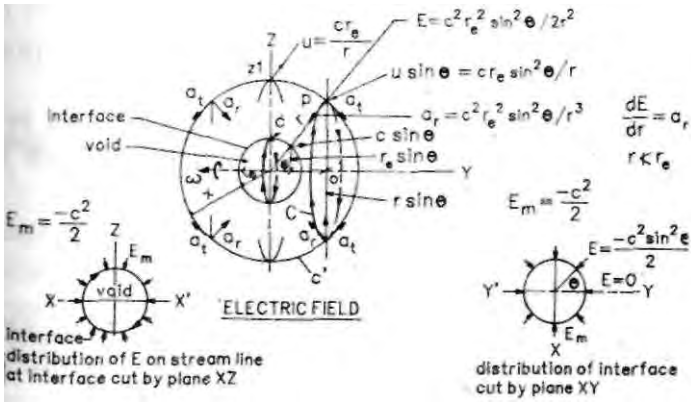

Interface
void
ELECTRIC FIELD
distribution of E on stream line at interface cut by plane XZ
distribution of interface cut by plane XY

Fig. 2-6 Interaction of e & p through their velocity fields.

which is an inward radial vector both for e* as well as p, with minimum value of r equal to r_e since the void is fieldless. The tangential component, a_t, of the inward acceleration field along PO is not taken into account for the generation of the electric field, because when integrated along the whole circle C', it gives zero electric field due to its changing direction in each quadrant. The value of E along Y- Y on the void interface, for $\theta = 0$, from 2.2 is zero. The maximum value E_t is in the transverse plane XZ when, $\theta = \pi/2$, and given by,

$$E_t = -c^2 r_e^2/2r^2 \qquad (2.3)$$

and at the interface, where, $r = r_e$ maximum possible value of E is $E_m = -c^2/2$. Refer Fig. 2.6. Confining, hereafter, the analysis in the plane XZ for simplicity, it can be shown that at z_1, Fig. 2.6, where vf is, $u = cr_e/r$, the electric potential ϕ at the radial distance r has the relationship with E_t as,

$$\frac{d\phi}{dr} = E_t = - c^2 r_e^2/2r^2$$

Therefore,

$$\phi = c^2 r_e^2/2r = c\, r_e\, (ur)/2r$$

$$= cr_e\, u/2 \qquad (2.4)$$

which proves that the velocity field u is the basic field that originates the electrostatic phenomenon of electric potential ϕ, the gradient of which is the electric field.

2.4. Dielectric constant and Coulomb's constant

The following equation, which is similar to Coulomb's law,

* electron and positron are abbreviated as e and p respectively.

can be derived for the electric field in XZ plane (fig. 2.6) from (2.3) and basic charge-equation (2.1.)

Multiplying and dividing the right hand side of 2.3 by $(\pi/4)\,4\pi$,

$$E_t = \frac{-c^2 r_e^2 (\pi/4)\,4\pi}{2r^2(\pi/4)\,4\pi} = \frac{-2(\pi/4)\,(4\pi r_e^2 c)c}{\pi\,4\pi r^2}$$

$$= \left(\frac{-2}{\pi}\right)\frac{1}{4\pi\,(1/c)}\,\frac{q_e}{r^2} \qquad (2.5)$$

The vf distribution on the interface streamlines varies from c in the plane XZ to zero on the axis of rotation. Due to this variation of vf, the charge distribution on the interface is not spherically symmetric. The co-efficient $\pi/4$ in 2.1 appears due to the above non-symmetry. For a spherically symmetric charge, the value of q_e will be $4\pi r_e^2 c$, dropping the coefficient $\pi/4$ in 2.1.

From the experimentally determined Coulomb's equation for electron as spherically symmetric point charge,

$$E = \frac{1}{4\pi\varepsilon_0}\,\frac{q_e}{r^2} \quad (2.6)$$

From 2.1, dimensions of q_e are $(\text{length})^3/\text{time}$. The dimensions of E from Eq. 2.2 are $(\text{length})^2/(\text{time})^2$. With these dimensions and comparing (2.5) and (2.6) for the same value of E_t and E it is discovered that,

$$\varepsilon_0 = \pi/2c \quad (2.7)$$

when the electron is chosen as the unit of charge.

In the cgs system of units, with CGSE unit of charge, the constant of proportionally, $1/4\pi\varepsilon_0$, (in 2.6) is unity, with the dimensions of, cm/sec, from 2.7. Therefore, adopting cgs system, from (2.5) and (2.6) and dropping the minus sign, indicative of the inward nature of E, in (2.5)

$$E = \frac{2}{\pi}\frac{c}{4\pi}\frac{q_e}{r^2} = \frac{cm}{sec} \times \frac{CGSE}{r^2}$$

or $$q_e = \frac{4\pi^2 CGSE}{2(3 \times 10^{10})} = 6.5 \times 10^{-10}\ CGSE \qquad (2.8)$$

which is quite close to the value $q_e = 4.8 \times 10^{-10}$ CGSE as experimentally determined. Since, Coulomb = 3×10^9 CGSE, from (2.8,) $q_e = 2.5 \times 10^{-19}$ Coulomb, against the experimental value of 1.6×10^{-19} Coulomb.

It thus gets evident that the light velocity 'c' is a factor in the CGSE unit, and Coulomb unit of charge.

From Maxwell's equation it was derived that,

$$c = 1/\sqrt{\mu_0 \varepsilon_0} \qquad (2.9)$$

where μ_0 is the permeability constant. From this fundamental relationship, it had become possible to predict that light is an electromagnetic field. From eqs. 2.7 and 2.9 it now gets evident that at a more fundamental level, when the electron is taken as the unit of charge, both μ_0 and ε_0 are inversely proportional to c.

The Coulomb's constant is a composite quantity and is directly proportional to the speed of light.

2.5. Guass' Law

A further proof to the new relationship, $\frac{1}{\varepsilon_0} = (2/\pi)c$, charge-equation, and eq. 2.2 for electric field, can be obtained by deriving Gauss' Law as follows:

Consider an elementary surface $dA = 2\pi r_e^2 \sin\theta\, d\theta$ on the interface (fig. 2.4) which will have an electric flux, E dA on it. Substituting the value of E at the interface from (2.2), we obtain

for the electric flux through the elementary area,

$$d\psi \approx (-c^2 r_e^2 \sin^2\theta/2r^2)\, 2\pi r_e^2 \sin\theta d\theta.$$

Integrating from $\theta = 0$, to $\theta = \pi$, we obtain for the total flux through the interface,

$$\psi = -(4\pi/3)c^2 r_e^2 = \frac{2}{3}\,\frac{(\pi/4)\,(4\pi\, r_e^2\, c)}{(\pi/2c)}$$

$$= (-2/3)\; q_e/\varepsilon_0$$

which is Gauss' Law, except for the coefficient, (-2/3)

2.6. Nature of mass

The mass is the effect produced by the void which, as discussed before, is created due to the vacuum breakdown and its displacement. In Fig. 2.4, the mass, dm, of the elemental volume, $dV = (\pi\, r_e^2 \sin^2\theta)\, r_e d\theta$, is fundamentally defined as,

dm = dV (speed of vacuum at the interface of the element)

$$(\pi r_e^3 \sin^2\theta d\theta)\; \omega\; r_e \sin\theta = \pi c\, r_e^3 \sin^3\theta\; d\theta.$$

Taking the integral over the whole volume of the void we obtain,

$$m_e = \int_0^{\pi} \pi\, c\, r_e^3 \sin^3\theta d\theta \approx (4\pi/3)\, r_e^3\, c \qquad (2.10)$$

Thus: Fundamental mass = Fundamental void volume x light speed.

The fundamental mass has dimensions, $(\text{length})^4/\text{time}$. Similar to charge, mass is also quantized due to the stability of only one size of void as discussed before. Nuclei of atoms and stable particles should have their rest masses in exact multiples of m_e. In cgs system, a new unit of mass, mu, with cm^4/sec, as its dimensions, can be shown to have relationship: gram = 7.8

x 10^6 mu as follows.

From the charge-equation, with cgs system, the dimensions of q_e are cm^3/sec. Therefore, CGSE = cm^3/sec, as shown in Section 2.4 during the derivation of the relationship (2.8).

From the charge-equation, $r_e = \sqrt{q_e / 4\pi c}$. Since,

$q_e = 4.8 \times 10^{-10}$ CGSE, which is 4.8×10^{-10} cm^3/sec,

$r_e = \sqrt{4.8 \times 10^{-10} cm^3/sec)/(4\pi)\ 3 \times 10^{10} cm/sec} = 4 \times 10^{-11}$cm,

and, therefore, electron's void volume will be 2.5×10^{-31} cm^3. The ratio of electron's mass to its void volume = 9×10^{-28} gm/ 2.5×10^{-31} cm^3 = 3.6×10^3 gm/cm^3.

One molecule of water is about 2.88×10^{-23}g. Supposing that electron is the fundamental unit of mass, and applying the, mass/void volume, ratio of electron for water molecule also, void volume of water molecule = 2.8×10^{-23} g/3.6×10^3 (gm/cm^3) = 8×10^{-27} cm^3. Since one cm^3 of water has 3.34×10^{22} nos. of molecules, total void volume of one cm^3 of water is $2.6 \times 10^{-4} cm^3$, which from mass-equation 2.10 is 2.6×10^{-4} cm^3 x 3×10^{10} cm/sec, that is, 7.8×10^6 mu. Since one cm^3 of water has mass of one gram, gram = 7.8×10^6 mu.

The relationship between mu and gram can also be alternatively derived. From mass-equation 2.10, substituting the value of r_e and c, $m_e = 7.5 \times 10^{-21}$ mu. Since $m_e = 9 \times 10^{-28}$ g as experimentally determined, gram = 8×10^6 mu, which is close to the value derived above. It is thus established that the relationship expressed in mass-equation for electron holds true for matter in molecular state also.

2.7. Concept of Density

Since the fundamental unit of mass, m_e, has been estab-

lished, density signifies the numbers of m_e per unit volume. With n fundamental mass units in a volume, its density is nm_e/volume. For a single electron, the ratio of mass to its void volume as calculated above, is 3.6×10^3 gm/cm^3, which also becomes the maximum possible density even for nuclear matter in the universe. A volume of vacuum, in the absence of void possesses zero mass and zero density.

2.8. Creation of Energy

In Fig 2.4, consider an elemental void volume, $dV = \pi r_e^2 \sin^2\theta \, r_e d\theta$, which is created due to displacement of vacuum through the interface at tangential velocity, $\omega r_e \sin\theta$. The mass of the disc element considered, as discussed above, $dm = dV\omega r_e \sin\theta$, which is $\pi r_e^3 c \sin^3\theta \, d\theta$. The element of interface in the disc has area $2\pi r_e \sin\theta \; r_e \; d\theta$, with an inward radial acceleration field, $\omega^2 r_e^2 \sin^2\theta / r_e \sin\theta$, that is, $c^2 \sin\theta / r_e$, everywhere on it. Consider the case when the elemental disc collapses, a process opposite to the creation of the void. The acceleration field, $c^2 \sin\theta / r_e$, will be radially displaced to a length $r_e \sin\theta$. The energy released due to collapse of the elemental disc is:

dE = dm (acceleration field) (displacement of field)

$$(\pi r_e^3 c \sin^3\theta \, d\theta)\,(c^2 \sin\theta / r_e)\,(r_e \sin\theta) = \pi r_e^3 c^3 \sin^5\theta \, d\theta.$$

Total creation energy, or, energy released due to collapse of the spherical void is,

$$E = \int_0^{\pi} \pi r_e^3 c^3 \sin^5\theta \, d\theta = \frac{4}{5} \frac{4\pi r_e^3 c}{3} c^2 = \frac{4}{5} m_e c^2 \quad (2.11)$$

The coefficient, 4/5, appears due to the velocity field of electron being axisymmetric rather than having spherical symmetry.

2.9. Electrostatic energy in the field of electron

The energy density in the electrostatic field of electron is

given by $\varepsilon_0 E^2/2$. From 2.2 and the relationship $\varepsilon_0 = \pi/2c$, we obtain for the energy density $dE_{electrostat}/dV = E^2/4c = (\pi/4c)$ $(c^4 r_e^4 \sin^4\theta/4r^4) = \pi c^3 r_e^4 \sin^4\theta/16r^4$. The integration for the total electrostatic energy over the whole space gives:

$$E_{electrostatic} = \int_{r_e}^{\infty} \int_0^{\pi} \frac{c^3 r_e^4 \sin^4\theta}{16r^4} 2\pi^2 r^2 \sin\theta \, dr d\theta$$

$$= \frac{\pi}{10} \frac{4\pi r_e^3 c}{3} c^2 = \frac{\pi}{10} m_e c^2 \quad (2.12)$$

The lower limit of radius in the above integration is $r = r_e$, because the void is fieldless. This avoids the present serious difficulty associated with a point-charge which has infinite energy in its electrostatic field due to r varying from zero to infinity.

The difference between the total creation energy eq. (2.11) and electrostatic energy eq. (2.12) is established in space as gravitational field energy as discussed in the next chapter.

2.10. Phenomenon of Electric charge

The fundamental unit of charge is of electron which is exactly equal to that of positron. The electron and positron are the same particle, and are so named dependent upon the position of the particles relative to a observer due to which the direction of spin is determined . It is the limiting spin of the spherical interface of ss that produces the charge-effect at the interface, electric field, and electric potential through the velocity fields in the vortex of the electron. The substance of charge is the dynamic state of ss or absolute vacuum, the particular value of electron's charge is due to the specific values of the light- speed and electron's void radius, that are basically dependent upon the absolute properties of ss.

A stable particle of subelectronic charge is not possible to exist in the universe. Quarks, with fractional electronic charge, are concluded to be hypothetical particles as per SVT.

The distribution of charge being only on the spherical interface, the fieldless void has zero charge within it. The existence of charge is inherent in the very structure of electron, and hence, during motion of the particle (discussed further), its charge cannot be dispersed or shaken off. Also, the phenomenon of charge is consequent to the creation of electron. The law of conservation of charge is operative where a number of electrons and positrons interact. When annihilation takes place, as discussed further, the light produced does not possess charge, because the charge-effect ends with the structure of the particle which vanished during annihilation.

2.11. Phenomenon of rest-mass

The breakdown of ss or absolute vacuum into void or 'hole', and the resulting stability of the void, produces rest-mass of the particle. There can be only one kind of fundamental rest-mass which is electron's. Fractional electronic mass is not possible in any stable particle in the universe. All stable particles that possess rest-mass must necessarily have their rest-masses in exact multiple of m_e. The particular value of m_e, is due to the specific value of r_e and c that are determined by the absolute properties of ss.

The principle of conversation of mass will hold true in phenomena where a number of electrons and positrons interact. After annihilation, the light produced does not possess mass, because the property of mass ends with the void structure of electron, which as discussed further collapses during annihilation of the electron and the positron.

The creation of gravity field due to rest-mass, inertia property due to void structure of electron and fluidity of ss, and relativistic mass are discussed in further chapters.

CHAPTER-THREE

GRAVITATION AND LIGHT

3.1. Gravitation

Consequent to the void creation, the creation energy, (4/5) $m_e c^2$ (from eq. 2.11), is distributed in space as velocity field which produces electrostatic field energy (π/10) $m_e c^2$ (from eq. 2.12), and the remaining energy, which is about (π/2) $m_e c^2$, is distributed as gravitational field energy. The gravitational field (fig. 3.1) is directly proportional to the radial displacement that each space point will undergo as the incompressible ss of volume equal to void's volume is radially forced out. A point of space, at a radial distance r from the void-centre, will have an inward gravitational field,

$$g = (k/4\pi c)\, m_e/r^2 \quad (3.1)$$

where k is, l/(unit time)^2, that is , 1 /sec^2, in cgs system, and is a 'convenient constant' introduced to obtain the appropriate dimensions of g.

The gravitational constant for electron, G_e, is $k/4\pi c$, that is, $1/4\pi$ (3 x 10^{10} cm/sec) sec^2 $\simeq$ 3 x 10^{-12}/cm. sec. The gravitational constant for atoms, G, as experimentally determined is 6.67 x 10^{-8} g^{-1} cm^3 sec^{-2}. Converting gram into mu,

$$G = (6.67 \times 10^{-8}) \times \left(\frac{cm^3}{7.8 \times 10^6\ mu\ sec^2}\right) \simeq 10^{-14}\ mu^{-1}/cm^3\ sec^{-2},$$

Since the dimensions of mu are cm^4/sec, G = 10^{-14} cm sec, which is about 300 times smaller than G_e. The reason for this difference is as follows:

In (3.1) G_e, (which is $k/4\pi c$), is inversely proportional to m_e/r_e^2 when gravitational, field is taken at the interface, where r = r_e. Since m_e is directly proportional to r_e^3, G_e will be inversely proportional to r_e^3/r_e^2, that is r_e. The Nuclei of atoms aree shown further to consist of a closely packed but discrete units of m_e. It can therefore be shown that G is inversely proportional to r_n, which is the nuclear radius. For an average atom, say 120 times the mass of proton, its mass, m_e = 120 (1.6×10^{-24}) g $\simeq$ 2 x.10^{-22} g or (2×10^{-22})(7.8×10^6) mu $\simeq$ 1.6×10^{-15} mu.From mass-equation, the radius* of this nucleus will approximately be,

$r_n = (1.6 \times 10^{-15} cm^4/sec)^{1/3} \times (3/4*PI*c)^{1/3} = 2 \times 10^{-9} cm$

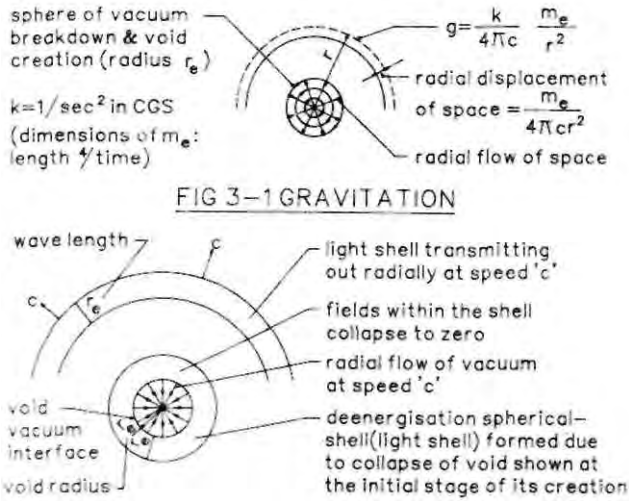

sphere of vacuum breakdown & void creation (radius r_e)
k=1/sec² in CGS
(dimensions of m_e: length ⁴/time)
$g=\frac{k}{4\pi c}\frac{m_e}{r^2}$
radial displacement of space = $\frac{m_e}{4\pi cr^2}$
radial flow of space
wave length
c
r_e
light shell transmitting out radially at speed 'c'
fields within the shell collapse to zero
radial flow of vacuum at speed 'c'
void vacuum interface
void radius
deenergisation spherical–shell(light shell) formed due to collapse of void shown at the initial stage of its creation

FIG 3–1 GRAVITATION

Fig. 3-2. Annihilation Light

*In the strict sense, mass-equation is applicable only to electron. It will give approximate results for nuclei, assuming closely packed particles in them.

Therefore,

$$G = \frac{G_e r_e}{r_n} = \frac{1}{4\pi c \sec^2} \frac{4 \times 10^{-11}}{2 \times 10^{-9}} = 6 \times 10^{-14} \text{cm. sec,}$$

which is only six times larger than the experimental value of G. The gravitational constant for heavier atoms will be smaller since it is inversely proportional to the nuclear radius. Also, the gravitational constant is inversely proportional to the light speed.

3.2. Fundamental nature of Light

Refer Fig. 3.2. Suppose, that under certain conditions, the void collapses, such that, the space flows radially within the void at the maximum possible speed c. Duration of collapse, $\Delta t = r_e/c$. During the period, Δt, a shell of radial width, $c\Delta t$, that is, cr_e/c, which is, r_e, will be formed and transmitted outwards at speed c, deenergising the universal space. The 'spherical shell' produced due to decay of fields, a de-energisation process consequent to the electron's annihilation, is the phenomenon of light. The wavelength is equal to r_e. The spinning interface of e has an angular momentum. In Fig. 2.4., considering an elemental volume $dV = \pi r_e^2 \sin^2\theta\, r_e\, d\theta$, and tangential velocity, $\omega r_e \sin\theta$, its mass will be, $dm = (\pi r_e^2 \sin^2\theta\, r_e\, d\theta)\, \omega r_e \sin\theta$, and the angular momentum will be,

$$dL = dm\, (\omega r_e \sin\theta)\, r_e \sin\theta = \pi r_e^2 c^2 \sin^5\theta\, d\theta.$$

Integrating from $\theta = 0$ to π for the total angular momentum,

$$L = \frac{4}{5} \frac{(4\pi r_e^3 c)}{3} cr_e = \frac{4}{5} (m_e cr_e) \quad (3.2)$$

The annihilation of electron causes the decay of L in time interval, r_e/c, which releases the energy at the interface equal to $L/(r_e/c)$, that is, $(4/5)m_e cr_e/(r_e/c)$ or, $(4/5)m_e c^2$. This

positive energy flows into the negatively energised* void ($-4/5\ m_e c^2$) and restores it to the zero energy state.

The flow of energy $(4/5)\ m_e c^2$ into the void, recovers this quantum of energy from the decay (collapse) of the fields at the interface, however, within the first de- energisation shell, formed on the interface, the positive field energy available is negligible fraction of the total requirement of $(4/5)/m_e c^2$, since the creation energy ($4/5\ m_e c^2$ is distributed as fields in the whole of the universe. The light shell at the interface is therefore depleted of energy, or rather negatively energised to an energy state of $(-4/5)\ m_e c^2$, and during its transmission, the fields decay into the shell giving positive energy to shell, thus making the shell less and less negatively energised. The wavelength, r_e, of annihilation light- shell, remains constant.

As shown before, the energy, produced at the interface due to the decay of L is, $E = (4/5)\ m_e cr_e/(r_e/c)$. Since the wavelength was defined as r_e, the numbers of successive shells formed in unit-time will be c/r_e, which will be defined as the frequency of the annihilation light.

Therefore,

$$E = (4/5)(m_e c r_e)f \qquad (3.3)$$

The quantity, $(4/5)\ m_e cr_e$, which is the angular momentum of the electron at the interface, will be defined as Planck's constant h, which, from (3.3), gives the Planck's energy equation, $E = hf$. The Planck's constant is not a fundamental quantity. It is a composite quantity comprising of m_e, c and r_e that are more fundamental than h.

As discussed before, the spherical shell of light leaves the interface and transmits out with negative energy, $-(4/5)\ m_e cr_e (c/r_e)$, that is, $-hf$, which is retained in the shell; and as the

* It was shown in section 2-8, that creation energy $4/5\ m_e c^2$, when delivered into the void, brings it to zero potential.

shell is transmitted out at speed c, the de-energisation, of the positive energy spatial fields, is achieved through the negative energy of the light shell.

3.3. Inter-relation of Light and Gravity

Consider an electron at distance R from P, which is (fig. 3.3) oscillating with an amplitude $\pm r$. The oscillation of e will result in the change of fields produced by e at P. Considering for the present only the gravitational field of e, the gravitational potential energy at P is given by,

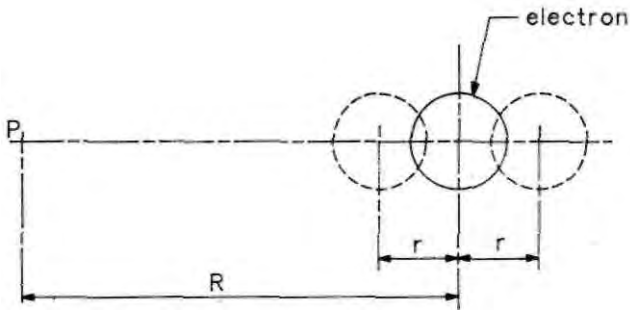


Fig. 3-3.

$$P.E. = G_e m_e^2/R \pm r$$

$$= G_e m_e^2 \frac{1}{R}\left(1 \pm \frac{r}{R}\right)^{-1} = G_e m_e^2 \frac{1}{R}\left(1 \pm \frac{r}{R}\right)$$

since $r << R$.

$$\frac{d(P.E)}{dr} = G_e m_e^2 \left(\pm \frac{1}{R^2}\right)$$

Expressing m_e in terms of r_e and c from the mass-equation, and since $G_e = k/4\pi c$, where $k = 1/sec^2$ in cgs system,

$$\frac{d(P.E)}{dr} = \frac{k}{4\pi c} \frac{m_e (4\pi r_e^3 c/3)}{R^2}$$

$$= k(m_e c r_e) r_e^2 / R^2 3c$$

Considering the gradient of P.E. at the interface where $R = r_e$,

$$\frac{d(P.E)}{dr} = k\,(m_e\, r_e\, c)\, r_e^2 / r_e^2\, 3c = kh/3c$$

$$\frac{d(P.E)}{dr/c} = (k/3)h$$

As the electron is displaced away from P, the effect of the decreasing gravitational potential is transmitted towards P at light speed, such that for the transmission upto the infinitesimal length dr, the time taken is dr/c, say, dt.

Therefore, $\frac{d(P.E)}{dt} = (k/3)\, h.$ (3.4)

The time rate of change of gravitational potential energy at some point is directly proportional to the Planck's constant. Since h was discovered by Planck in the light phenomenon and in Planck's energy equation, E = h f, it is concluded from (3.4) that a time varying gravitational potential produces light effect. During the annihilation of e and p, since the gravitational collapses to zero, there is a time varying potential which, therefore, produces light consequent to the annihilation.

It will be shown further that atoms posses in their nuclei fundamental particles (e and p) of only one kind. Also with the orbit electrons, the overall charge-effect external to the electron orbits is neutralized. Therefore, the net field is only the gravitational field external to the atomic orbits, in neutral atoms. An atom in oscillation, similar to the electron as discussed above, will produce light-effect due to the time varying potential of the oscillating atom. This can be proved by deriving the value of Planck's constant from (3.4) as follows:

The period of atomic vibration is about 10^{-15} sec. It was derived in section 3.1, that mass of an average atom,

$m_a = 2 \times 10^{-22}$ g, and the nuclear radius $r_n = 2 \times 10^{-9}$ cm. It will be shown in Section 3.4 that one wavelength of light is produced during half period of atomic vibration, which is $(1/2)\ 10^{-15}$ sec. Gravitational potential energy, P.E., at the surface of the vibrating atom, is Gm_a^2/r_n, which, from above value, is $(6.67 \times 10^{-8})(2 \times 10^{-22})^2 / (2 \times 10^{-9})$, or, 13.34×10^{-43} erg. The duration 'dt' of (3.4) as given above, is $(1/2)\ 10^{-15}$ sec. Therefore, from (3.4)

$$\frac{d(P.E.)}{dt} = \frac{13.34 \times 10^{-43}\ \text{erg}}{(1/2)\ 10^{-15}\ \text{sec.}} = \frac{h}{3\ (\text{sec}^2)}$$

or, 8.01×10^{-27} erg/sec. = h/sec^2

or, $h = 8 \times 10^{-27}$ erg sec,

which compares close to the experimentally determined value of h = 6.62×10^{-27} erg sec. considering the approximate nature of this analysis.

3.4. Wavelength and Frequency:

In Fig. 3.4 an atom A is oscillating with vibrations f_a. The period of oscillation is $1/f_a$. The time taken for A to move from the extreme left to the extreme right position is $1/2f_a$. At the instant, when A starts moving towards right, a decrease in gravitational P.E. is produced at L, and is transmitted away from A, as shown in the figure at speed c. The region between L and R also sees the changes in P.E. Also, as A starts moving from L, an increase in P.E. immediately next to A takes place, and is transmitted towards R at speed c. The two effects are shown as λ_{a1}, and λ_{b1}. (The spread of λ_{b1} is shown ahead of R position since the average velocity of displacement of A is considered less than c). Similarly, when A starts from R towards L, the opposite effect takes place, and λ_{ar} and λ_{br} are formed as shown in the accompanying sketch. The front of λ_{ar} at R' follows λ_{b1}

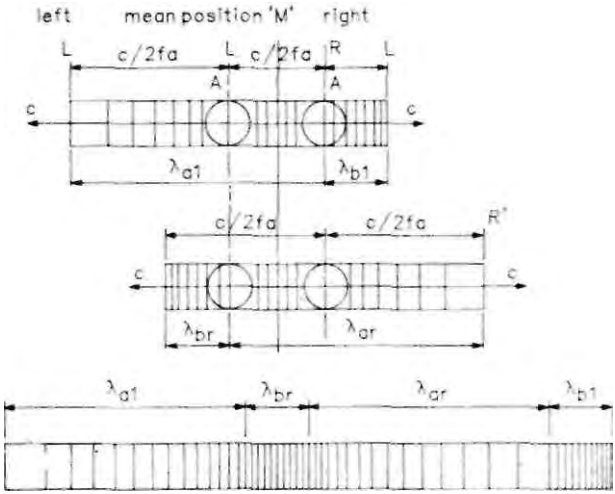


Fig. 3-4.

at R. Similarly the front of λ_{a1} at L' follows λ_{br} at L. The total length c/f_a or, $(\lambda_{al} + \lambda_{bl})$, should be taken as the wavelength λ of light produced due to atoms vibration, though light effect in the spectrum should be confined to the spread λ_{al} (also λ_{ar}) only, where there is a decreasing potential. The frequency of light should be defined as the number of wavelengths λ so as to make a total length which is transversed by light in unit time. Therefore, $c = \lambda f$.

Let the atom A move at velocity v relative to ss towards R while also vibrating at frequency f_a. As the atom moves towards R from L position, the formation of light shell now takes place at speed c + v towards L' and c-v towards R'. The spread λ_{al} is now increased by $v/2f_a$, whereas λ_{b1} is decreased by $v/2f_a$.
The total spread, λ, which is now, $\lambda_{a1}+v/2f_a+\lambda_{b1}-v/2f_a$, remains constant as $\lambda_{a1} + \lambda_{b1}$. The relationship, $c = \lambda f$ remains
valid for the light source (vibrating atom) even when there is motion of atom relative to space, except that the lengthening of

spread λ_{a1}, to new length $\lambda_{a1} + v/2f_a$ changes the quality of light, producing 'red-shift' effect as seen by an observer towards L. If the vibrating atom moves nearer to the observer, located towards L, there will be effect opposite to 'red-shift', that is, the light will shift towards the violet in the spectrum.

The spectrum emitted by compounds and gases (nitrogen, oxygen) at low temperatures and high pressures, consisting of bright bands separated by dark spaces is produced due to formation of light effect discussed above. The bright bands should be due to decrease in gravitational P.E., whereas the dark spaces are due to increase in P.E. The wavelength and frequency of light produced by a vibrating atom will change only when the period of vibration of atom changes.

3.5. Radius of the Universe

In Section 2.9, it was stated that the difference between the creation energy $(4/5)\ m_e\ c^2$, and the electrostatic energy $(\pi/10)m_e c^2$, is established as gravitational field energy in the universe.

$$E_{gravitational} = \left(\frac{8-\pi}{10}\right) m_e c^2 \sim (1/2)\, m_e c^2 \qquad (3.5)$$

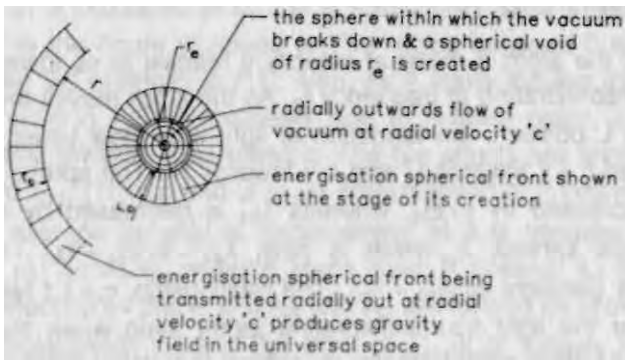

the sphere within which the vacuum breaks down & a spherical void of radius r_e is created
radially outwards flow of vacuum at radial velocity 'c'
energisation spherical front shown at the stage of its creation
energisation spherical front being transmitted radially out at radial velocity 'c' produces gravity field in the universal space
r_e
r
r_s
r_g

Fig. 3-5.

In Fig. 3.5, a spherical shell of radius r, which gravitationally energises the universe following the void creation, and has a constant shell width, r_e, is shown.

Since r_e is much smaller compared to r, the mass-equivalent of this shell, from mass-equation, is $c(4\pi r^2 r_e)$. The gravity field on each space point within the shell, from (3.1), is $km_e/4\pi cr^2$.

Energy required to displace the spherical shell to a radial length R, where R is the radius of the ss of the spherical universe,

$$Eg = \int_O^R (\text{mass of the shell}) \left(\begin{array}{c} \text{gravity field within shell} \\ \text{at each space point.} \end{array} \right) dr$$

$$= \int_0^R c\,(4\pi\, r^2\, r_e)\, \frac{km_e}{4\pi c\, r^2}\, dr = km_e\, r_e\, R \quad (3.6)$$

since from (3.5), $E_g = (1/2)\, m_e\, c^2$,

$$km_e r_e R = (1/2) m_e c^2$$

$$R = (1/2) c^2 sec^2/r_e \quad R = (1/2)\, 10^{31} \text{ cm.}$$

3.6. The mystery of Gravitation

The spherical universe of the substantial space (Fig. 3.6) of radius $(1/2)\, 10^{31}$cm, exist in a dynamic state in an infinite field-less void which can have no interaction with the phenomena within the space of the universe. An infinite numbers of the spherical universes in an infinite extension of void is only a matter of speculation. Within the spherical universe, when a void of electron is created, all the space points of the universe are displaced from their positions away from the electron's void centre, as discussed is section 3.1, and this displacement energises the universe gravitationally, while also increases its total volume by

the void volume of the electron. Thus, with the creation of cosmic matter within the universe, the universal sphere of ss expands in its size in a true sense. The gravitational energisation of the universe is consequent to the voids creation (matter creation), whereas, the dynamic state of ss, that is, the universal velocity fields (due to ss motion) are the most basic state of the universe-a dynamic plenum, that is eternally existent with the phenomena

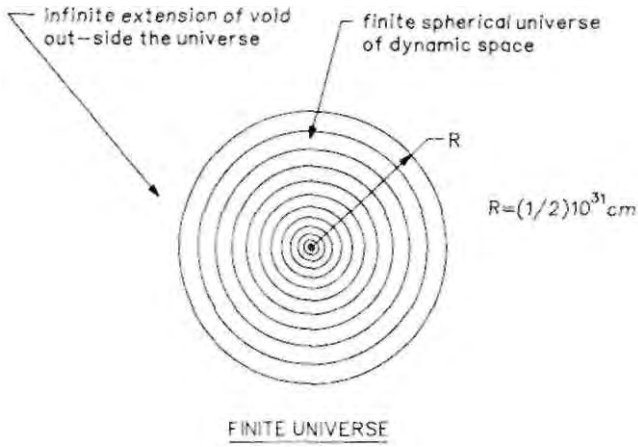


Fig. 3-6. Finite Universe

of "creation" or "annihilation" being inapplicable to it. The gravitational and the electrostatic fields are generated simultaneously with the void creation. The electromagnetic fields are 'generated' or rather 'converted' from the gravitational fields. The gravitation, therefore, is more fundamental than the electromagnetic effect. The magnetic fields, as discussed in the next chapter, are produced when the electron void moves in space, and hence are not as fundamental as gravitational fields.

As shown in Fig. 3.6a, the atoms of a body are stationary in a static space, under the balance of their own inward gravitational forces. When two bodies are brought closer, the superposition of the inward gravity fields upsets the balance of the forces on each atom of the bodies which, therefore, move

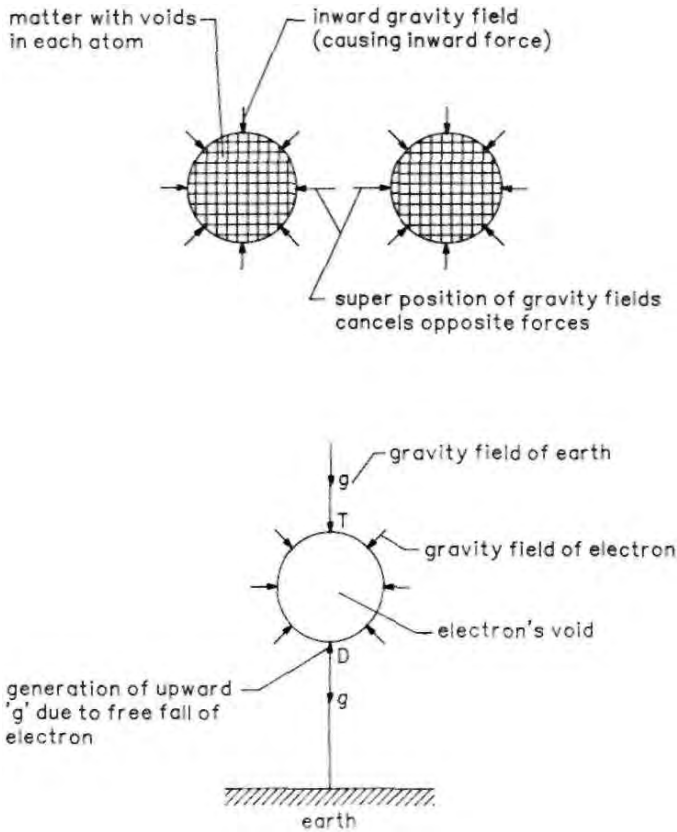


Fig. 3-6b.

Earth in the direction of the resultant force, causing gravitational attraction. The gravitational fields are originally transmitted out at speed c in space at the instant when each electron is created. Thereafter, after the assembly of atoms and formation of the cosmic bodies, if their interspacings change due to their acceler-

ation in the universal space, the super-position of their gravitational fields gives rise, at a point in space, to either light (cosmic background radiation, if the gravitational potential decreases there) or additional gravitational potential (gravity pulses) if the distances between the cosmic bodies decrease.

In Fig. 3.6b, an electron is shown in the gravitational field of the earth. Considering only the gravitational field of electron and that of the earth, the superposition of the two gravity fields, will upset the stability of the spherically symmetric inward gravity forces on electron's void. Along the vertical line, the gravity fields add on electron's top T, and subtract at D. Neglecting the small changes in the earth's gravity field along the vertical line due to the superposition, since the gravity field of electron is compara tively much weaker, it can be supposed that the downward force on the electron is $m_e g$. As the electron, initially supposed to be stationary, accelerates to g in a short interval* it develops at D an upward acceleration field of the same magnitude as g due to the displacement of ss by its void, and the subsequent reaction of the acceleration field towards the void centre (discussed in detail in the following chapter). As the upward acceleration field at D equals the downward g at T, the electron will temporarily come to stop, due to which the upward acceleration field at D will reduce to zero, and the downward fall of electron will ensure again. The above process of "jumps" continues due to which the electron falls vertically down with acceleration g. Since, matter, as shown further, has electrons as its basic constituent, irrespec tive of mass, all bodies have a free fall on the earth with the same acceleration g. The gravitational mass, and the inertial mass are both the same, because void volume is common to both the phenomena. When mass is initially created, ss is dis placed out, creating the gravity fields which result in gravitational forces. Also, when an electron moves in ss, its void displaces ss and gives rise to **inertia property.

*The shortest time interval during which a body accelerates from rest to some uniform velocity is discussed in the next chapter.

**The property of inertia is analysed in the next chapter.

If an electron is kept in an electric field along with a proton (supposed to be of the same charge), both the particles will be experiencing the same force, however, electron being lighter will accelerate faster than proton. (The force of inertia, due to the mass of the particles, opposes the electrical force on the particles, and in the case of electron, the opposing force is lesser). However, when the particles of different masses are placed in the gravity field of the earth, they experience different gravitational forces proportional to their masses, and yet are accelerated down to the same acceleration g, due to the generation of the upward acceleration field g as explained above.

The gravitational field, being an acceleration field, can be created by accelerating a body. A freely falling carriage develops on each of the particles that constitute it, an upward acceleration field g, which nullifies the downward g on the carriage. The basis for the creation of the upward g is the same as in the case of a freely falling electron, as shown above. The upward gravitational field g, generated by the free fall, is parallel to the line of fall, and exists as long as the acceleration due to the fall continues, whereas, the gravitational field created due to the void of electron, is permanent, radial and spherically symmetric field.

CHAPTER-FOUR

DYNAMICS OF ELECTRON VOID

4.1. Momentum

In Fig. 4.1, the void of electron moving at uniform velocity v is shown. Since void is a fieldless cavity, its motion displaces the fluid space. A point P at the interface will displace space horizontally at velocity v, which will have radial and tangential components as shown. While the radial velocity components at the front of the void give the velocity of displacement of space, the radial velocity components at the rear give the inflow velocity of space into the cavity left due to the motion of the void (Fig. 4.3). Therefore, as regards the contribution to work done in displacing the space is concerned, the radial velocity components at the front of the void cancel those at the rear. The tangential components, $v\sin\theta$, at each interface point, however, remain as resultant velocity field.

In Fig. 4.1, an elemental volume of void, $dV = \pi (r_e^2 \sin^2 \theta)\, r_e\, d\theta$, displaces space at velocity, $v\sin\theta$, as discussed above. The momentum of the elemental volume from mass-equation will be defined as,

$$dp = c\,(dV\, v\sin\theta)$$

$$= cv\pi\, r_e^3 \sin^3\theta\, d\theta$$

Integrating from $\theta = o$ to π, for the total momentum of the void,

$$dp = \int_0^{\pi} \pi\,(cv\, r_e^3 \sin^3\theta\, d\theta) = (4\pi\, r_e^3\, c/3)v$$

$$p = m_e v \qquad (4.1)$$

The displacement of the void from rest requires imparting energy to it so that the fluid ss is displaced and velocity fields are created. These velocity fields, once created, carry the void linearly in the direction of its displacement giving rise to the in-ertial principle. A change in the direction of the linearly moving void requires displacement of ss in that direction, and hence requires force to do so.

4.2. Kinetic Energy

Refer Fig. 4.4, in which an electron's void is moving uniformly at velocity v relative to space. The tangential velocity, $v\sin\theta$, develops a radial acceleration, $v^2 \sin^2\theta / r_e$, which, when reacted by space, becomes an inward radial acceleration, $a_r = v^2 \sin^2\theta / r_e$, acting on the interface of an elemental volume $dV = (\pi r_e^2 r_e \, d\theta) = \pi r_e^3 \, d\theta$. The mass equivalent of dV from mass-equation is $dm = dVc = \pi c r_e^3 \, d\theta$.

When the void is displaced from rest, its velocity changes from zero to v, and energy is required to create the outward a_r (which reflects as inward a_r) on the front half of the void. At the rear half of the void energy is not spent in the creation of a_r since the void leaves a cavity (Fig. 4.3), at its rear-end due to its forward motion. The energy spent in displacing the void upto a length r_e from zero velocity to velocity v, will be defined as:

$$\text{K. E.} = 1/2 \; dm \; a_r \; r_e$$

which is only half the energy derived from the displacement of a_r (on the whole interface) to a radial length r_e.

$$\text{K. E.} = 1/2 \int_o^\pi \pi c r_e^3 \, d\theta \, \frac{v^2 \sin^2\theta}{r_e} \, r_e$$

$$= 1/2 \int_o^\pi \pi c v^2 r_e^3 \sin^2\theta \, d\theta$$

$$= \frac{\pi^2}{4} c r_e^3 v^2$$

$$= \frac{3\pi}{16} \frac{(4\pi r_e^3 c)}{3} v^2$$

$$\simeq 1/2\, m_e v^2 \qquad (4.2)$$

The coefficient, $3\pi/16$, is not exactly 1/2 as is the case in the classical expression of kinetic energy.

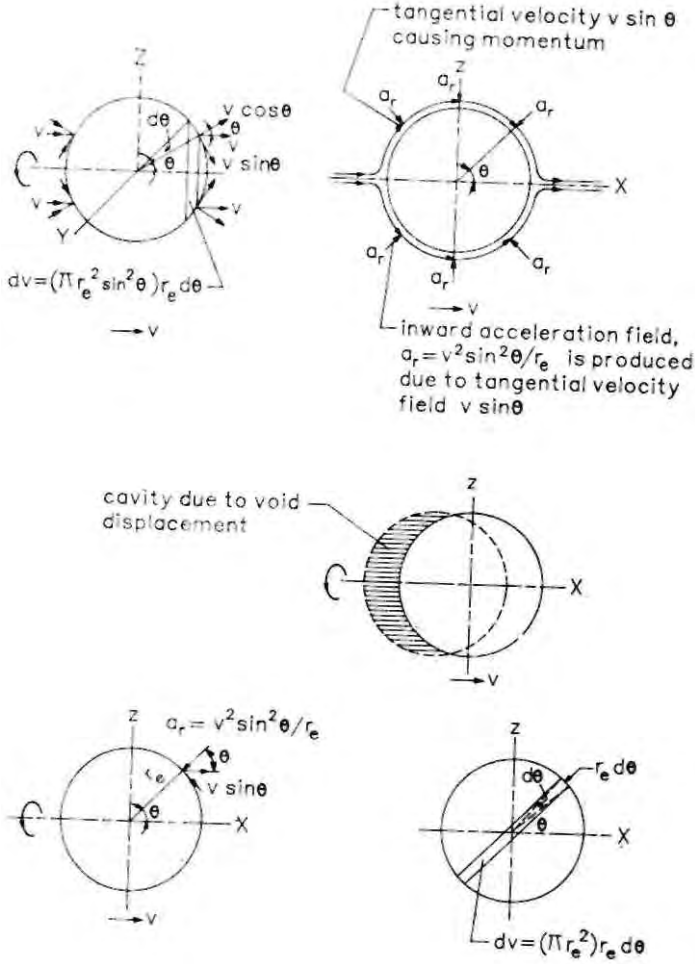

tangential velocity v sin θ causing momentum
v cosθ
v sinθ
dv=(πr_e²sin²θ)r_e dθ
inward acceleration field, a_r=v²sin²θ/r_e is produced due to tangential velocity field v sinθ
cavity due to void displacement
a_r= v²sin²θ/r_e
r_e dθ
dv=(πr_e²)r_e dθ

Fig. 4-3.

Consider a hypothetical case in which a_r is spherically symmetrical with the same maximum value v^2/r_e at each point on the spherical interface. An elemental volume, $dV = 4\pi r^2 dr$, within the void and before the creation of the void (Fig.4.5) will have its mass-equivalent, $dm = c4\pi r^2 dr$. The energy required for displacement of dV against v^2/r

$$\text{K. E.} = \frac{1}{2}\int_0^{r_e} c4\pi r^2\, dr\, \frac{v^2}{r}\, r$$

$$= \frac{1}{2}\left(\frac{4\pi r_e^3 c}{3}\right)v^2$$

$$= \frac{1}{2} m_e v^2 \qquad (4.3)$$

The coefficient, 1/2, is obtained only with the spherical symmetry of the acceleration field of the same magnitude everywhere on the spherical void. When the motion of a single electron is considered, as derived above, the coefficient is $3\pi/6$.

4.3. Inertia

When a void is displaced from rest upto a displacement equal to r_e, it sets up the velocity fields at the front and rear half of the void (Fig. 4.1). The inward acceleration field a_r at the front of the void (Fig. 4.2) is opposed by the similar acceleration field set up at the rear and, in addition, to the externally applied force, which acts during the period required to displace the void upto a length r_e, since the void starts from rest (zero velocity) and reaches a velocity v. The average velocity of displacement will be v/2, and the duration of displacement upto a length r_e will be $2r_e/v$. The rate of change in momentum will be $m_e v/(2r_e/v)$, that is, $m_e v^2/2r_e$, which is the externally applied force. The energy required to accelerate the void to velocity v will be $(m_e v^2/2r_e)r_e$, which is $1/2 m_e v^2$ as earlier derived. It

is concluded that all material bodies, irrespective of mass, are required to be displaced upto a minimum length r_e in order to overcome inertial force, since, as it is shown further, all nuclei are assembled out of the similar voids of radius r_e.

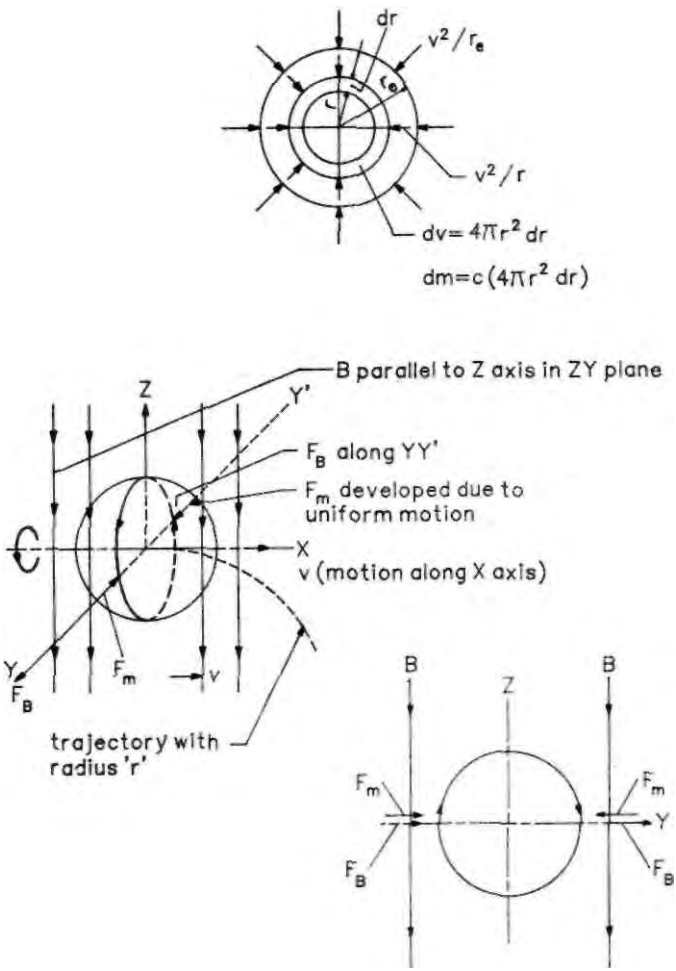


Fig. 4-6.

A uniformly moving void has inward acceleration field on each point of its interface, as shown in Fig. 4.2. There is no net acceleration field and hence no net force, so that it moves in straight line at uniform velocity and in the same direction as per Newton's first Law of Motion.

4.4. Relativistic Mass

For an electron, which is moving uniformly at velocity v relative to space, total energy will be:

$$E_t = m_e c^2 + 1/2\, m_e v^2 = m_e c^2 \left(1 + \frac{v^2}{2c^2}\right)$$

$$\text{At } v << c, \quad \frac{1}{\sqrt{1 - v^2/c^2}} = 1 + v^2/2c^2,$$

so that the expression for the total energy becomes,

$$E_t = \frac{m_e c^2}{\sqrt{1 - v^2/c^2}} \quad (4.3)$$

The acceleration field a_r, developed due to electron's motion at $v << c$ and responsible for kinetic energy of electron, being less than the limiting acceleration field c^2/r_e, no additional mass can be created. The value of m_e, thus, remains unchanged from the rest mass. However, if as a hypothetical case (ignoring the actual mechanism of mass creation), it is assumed that the rest-mass, m_e is changed (mathematically) to new relativistic mass m_r due to its motion, its equivalent energy being $m_r c^2$, the total energy E_t will become $m_r c^2$. That is,

$$E_t = m_r c^2 = m_e c^2 / \sqrt{1 - v^2/c^2}, \quad (4.4)$$

which is similar to Einstein's equation for the relativistic mass, derived only as a hypothetical case ignoring the physical aspects of mass-creation and, also, with the mathematical approximation for $v << c$.

The additional mass can be created from the kinetic energy only when the electron is made to move at velocity c, so that, a_r becomes equal to c^2/r_e, and the minimum kinetic energy of motion of particle (which can be heavier than m_e) is greater than $m_e c^2$. The additional mass so created may remain as an independent stable entity, another e or p, if it does not undergo annihilation. The inertial mass of matter does not, however, change with the velocity of motion for $v << c$, and for v approaching c, the conditions discussed above must be satisfied for the creation of mass in individual units of m_e.

The acceleration field a_r plays a crucial role in the deflection of e (from straight course to a curved path) moving at right angles to a magnetic field. The magnetic force F_B, acting at right angles to the electron's motion as shown in Fig. 4.6, is given by,

$$F_B = q_e^* B v = (4\pi r_e^2 c) Bv$$

$$= \frac{3}{r_e}\left(\frac{4\pi r_e^3 c}{3}\right) Bv = \frac{3m_e Bv}{r_e} \quad ...4.5$$

Also, in transverse plane YZ, $a_r = \frac{v^2}{r_e} \sin \pi/2$, (at the interface) develops the inward transverse force due to uniform motion of e.

$$F_m = m_e v^2/r_e = \frac{m_e v^2}{c^2}\left(\frac{c^2}{r_e}\right), \qquad (4.6)$$

There is also the centripetal force, $m_e v^2/r$, where r is the radius of curvature of electron's trajectory. When v equals c, F_m becomes $m_e c^2/r_e$, which is the limiting force on e. It is seen in the above relationships that F_B is directly proportional to v, whereas, F_m is directly proportional to v^2. Therefore, as v approaches c, the increase in F_m is faster than in F_B. Though F_m is opposite to F_B, at $v << c$, the magnitude of F_m being

proportional to v^2/c^2, the reduction in F_B is negligible. However, as v approaches c, the magnitude of F_m is comparatively larger, due to which tbe net force on e, which, being now reduced, the electron experiences a reduced traverse force, and, hence, the radius of curvature is increased. It is due to this, that the value of the radius of curvature obtained by classical relation, $r=m_e v/q_e B$, is less than the value experimentally obtained, since the actual relationship will be:

$$F_B - F_m = m_e v^2/r$$

$$q_e v B - m_e v^2 r_e = m_e v^2 r$$

Expressing q_e in terms of c and r_e, for spherically symmetric* point-charge,

$$(4\pi r_e^2 c)\, vB - \frac{m_e v^2}{r_e} = \frac{m_e v^2}{r}$$

$$\frac{3}{r_e}\left(\frac{4\pi r_e^3 c}{3}\right) vB - \frac{m_e v^2}{r_e} = \frac{m_e v^2}{r}$$

$$\frac{3}{r_e} m_e vB - \frac{m_e v^2}{r_e} = \frac{m_e v^2}{r}$$

$$r = \frac{v r_e}{3}\left(\frac{1}{B - v/3}\right), \quad (4.7)$$

whereas the classical relations is: $r = m_e v/q_e B$,

which, when m_e and q_e are expressed in terms of c and r_e becomes,

$$r = \frac{(4\pi r_e^3 c/3)\, v}{4\pi r_e^2 c\, B} = \frac{v r_e}{3B}, \quad (4.8)$$

*For a spherically point charge (Section 2.4) $q_e = 4*pi*r_e^2*c$.

From (4.7), it will seen that r is not only directly proportional to v, as in classical relation (4.8), but also inversely proportional to (B-v/3), rather than B of (4.8), and the value of r, therefore, has a faster increase with the increase in v. Since B can have maximum value equal to c (discussed further), when v approaches c, the factor, 1 /(B - v/3) becomes 3/2c, and therefore the value of r will be 1.5 times the value obtained from the classical relation at the limiting value of B, and v approaching c. When B is, say, 2c/3, then at v=c, the factor 1/(B-v/3) becomes 1/(c/3), and gives a value of r which is twice the value obtained from classical relation.

The increase in r above the value given from the classical relationship, for electron moving at high velocity when $(v/c) \rightarrow 1$, is considered by Special Relativity as failure of Newtonian mechanics, which, as per Einstein, becomes only a special case of a more general theory - Special Relativity. The above discussions, however, show that the additional transverse acceleration field arising from space and void interactions at high velocity, when taken into account, explains the experimentally observed results of increase in r at high velocity without requiring any increase of inertial mass m_e with velocity as concluded by Special Relativity. The conclusions are:

> At high velocity of motion, additional fields, due to reaction from ss with the spherical void of the funoamental matter, are generated. The Newtonian mechanics, that considers mass as a point-entity, is indeed an approximation. However, increase in rest-mass with the velocity of particle, as proposed by Special Relativity, is physically impossible.

4.5. Magnetic Field

In Fig 4.7a, an electron moving along X-axis, is shown to pass through the transverse plane ZY with uniform velocity relative to ss. At each point of the circle cut by the interface and the YZ plane, the tangential velocity is c sine, whereas, in posi-

tion-1, (Fig. 4.7b), when P coincides with the origin, the tangential velocity is zero, since the radius of the circle cut by YZ plane and the interface is zero. The tangential velocity at each point of the circle cut by the plane YZ and the interface is maximum in position-2 when half the void has passed through the plane

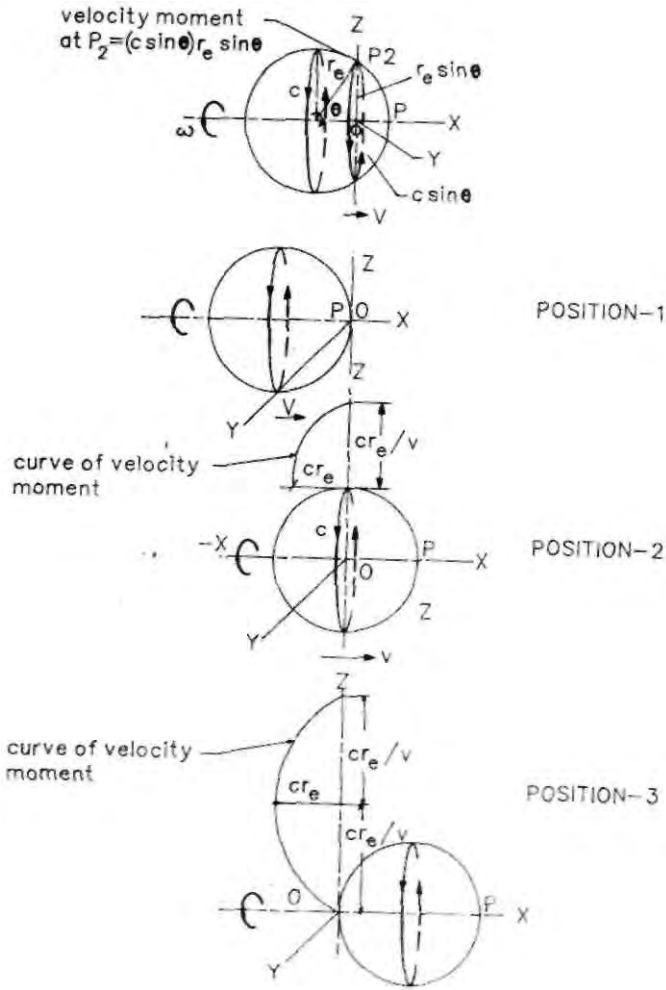


Fig. 4-7.

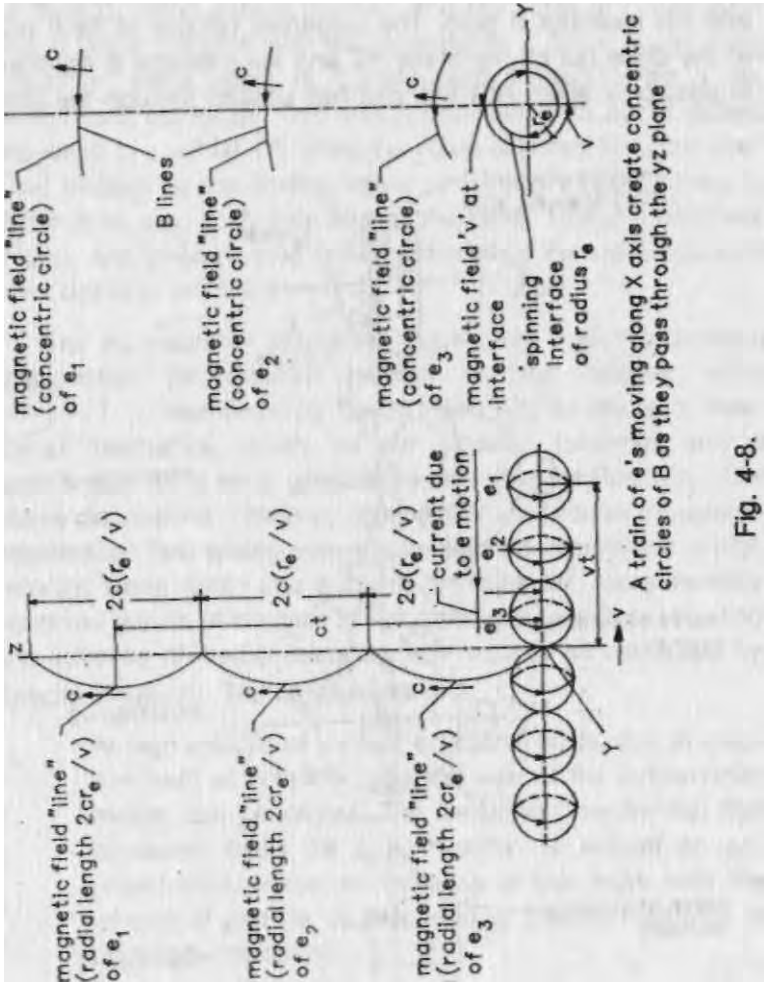

magnetic field "line" (concentric circle) of e_1
B lines
magnetic field "line" (concentric circle) of e_2
magnetic field "line" (concentric circle) of e_3
magnetic field 'v' at interface
spinning interface of radius r_e
magnetic field "line" (radial length $2\pi r_e/v$) of e_1
magnetic field "line" (radial length $2\pi r_e/v$) of e_2
magnetic field "line" (radial length $2\pi r_e/v$) of e_3
$2c(r_e/v)$
$2c(r_e/v)$
$2c(r_e/v)$
ct
current due to e motion
e_1
e_2
e_3
vt
A train of e's moving along X axis create concentric circles of B as they pass through the yz plane

Fig. 4-8.

YZ (Fig.4.7c). Thus, as the void is displaced through the YZ plane upto a horizontal length r_e, a circle with centre on the origin is opened in YZ plane with radii varying from zero to r_e. The clockwise spin of the interface (looking towards the origin from a point on the -X-axis) tends to impart to this circle, a circulation, which varies from zero in position-1, to the maximum $2\pi\ r_e c$ in position-2, and this change occurs in an interval r_e/v. At the instant when the vertical diametrical plane of the interface passes through YZ, a reverse process starts, and the circulation in the plane YZ reduces from $2\pi r_e c$ to zero in time interval r_e/v. Defining the quantity, $(c\sin\theta)\ r_e \sin\theta$, as velocity moment at point P_e in Fig. 4.7a, maximum change in velocity moment is $(c \sin\pi/2) r_e \sin/2\pi$ that is, cr_e, in time interval r_e/v. The tendency of the spinning interface of e to create circulation in YZ plane is reacted by a counter spin impulse which creates magnetic field as a concentric circle that transmits radially cut in space at velocity c, (Fig. 4.8).

During the time interval, $2\ r_e/v$, which is the time required by e to pass completely through YZ, the radial spread of spin impulse in YZ plane is, $2c\ (r_e/v)$, since all field effects are transmitted in space at speed c. This radial spread is to be considered as the 'radial length' of the magnetic field as shown in the figure.

Along half the radial length, cr_e/v, the velocity-moment increases from zero to cr_e, and then decreases back to zero. Therefore, the gradient of velocity moment within the radial-length of the magnetic field will be,

$$\frac{cr_e}{cr_e/v} = v \quad (4.9)$$

which is defined as the magnetic field B, and will be taken tangential at each point to the interface circie with radius r_e in YZ plane. If the electron moves at $v \rightarrow c$, the magnetic field B will approach c, and will be tangential at each point of the circle of radius r_e in YZ plane. Since the circulation $2\pi r_e c$ creating the

B-vector on a circle with perimeter $2\pi r_e$, initially, is distributed on successive circles with increasing radii, the magnetic field B at a radial distance r from the origin and in the YZ plane will be,

$$B = vr_e/r \qquad (4.10)$$

The counter spin impulse as the reaction from space, causes the direction of B vector opposite to the direction of the spin (velocity field vectors) as shown in Fig. 4.8. An electron, with zero linear velocity relative to space, will have zero magnetic field from (4.10).

The magnetic field distribution as concentric circles around the axis of electron's motion indicates that if a conductor moves along a concentric circular path, there is no change in velocity moment and hence no magnetic field or flux linkage. Any change in B linking with the conductor will require a radial component of motion of conductor relative to the magnetic field (on concentric circles). The maximum value, of dB/dt, will be when the conductor moves radially or at right angles to the magnetic field, causing maximum magnetic induction.

4.6. Ampere's Law

From Ampere's law, the lines of magnetic induction for a straight wire carrying a current i are concentric circles centered on the wire. At a radial distance r, B is given by,

$$B = \mu_0 i/2\pi r,$$

where μ_o is the permeability constant. Considering the linear motion of a single electron (in the current) at velocity v relative to space, the above relationship becomes,

$$= \frac{\mu_0 d(q_e)}{dt} = \frac{\mu_0(\pi/4)(4\pi r_e^2 c)^2\,(cr_e/v)}{2\pi r} \qquad (4.11)$$

Since in time, $2r_e/v$, an electron traverses trough YZ plane

(discussed in section 4.5) thus bringing about a change of change of charge q_e in time $2r_e/v$.

Since from (4.10), B at a circle with radius r_e is equal to v, (4.11) becomes,

$$v = \frac{\mu_0(\pi/4)\, 2\pi r_e c v}{2\pi r}$$

or,

$$1 = \mu_0 c(\pi/4)$$

$$\mu_0 = 4/c\pi \qquad (4.12)$$

The permeability constant μ_o is inversely proportional to the light speed c with q_e as the unit of charge.

It was shown in section 2.4 that $E_o = \pi/2\ c$.

Therefore,

$$\frac{1}{\sqrt{\mu_0 E_0}} = \frac{1}{\sqrt{\frac{4}{c\pi}\frac{\pi}{2c}}} = \frac{c}{\sqrt{2}}$$

which is an already known and experimentally valid relationship, except for the coefficient, 1 /2, which is appearing due to $q_e$not having spherically symmetrical charge distribution.

Alternatively, with the relationship, $\mu_o = 4/c\pi$ and (4.10) for the magnetic field, Ampere's law can be derived from the uniform motion of a single electron relative to space.

4.7. Direction of Magnetic Field

The electron vortex with clockwise spin moves forward as shown in Fig.4.8. If we consider a torus shaped bundle of vortex lines (Fig.4.9.), motion is possible due to the circulation velocity in the inner side of the ring, as represented by the streamlines Bt1, At and Bb, Ab1 that are shown coming out of the figure. The

direction of stream lines v determine the directions of streamlines A and B. The streamlines A going down at the top of the ring, come out as At, and also as Ab1 and Ab2 at the lower end of the vortex. Similarly, the streamlines B going down at the bottom of the ring, come out as Bb, Bt1 and Bt2. The superposition of the velocity fields creates a weakened zone and strengthened zone as shown in the figure. The vortex moves towards +X due to streamlines in the strengthened zone. Now since direction of B is shown (Fig.4.8)opposite to the velocity field that is along the vortex lines, a clockwise-spin and forward moving electron will have anti-clockwise magnetic field. Since the direction of electron motion is taken opposite to the current direction, a forward moving electron with anti-clockwise magnetic field lines is equivalent to an electric current in opposite direction towards the

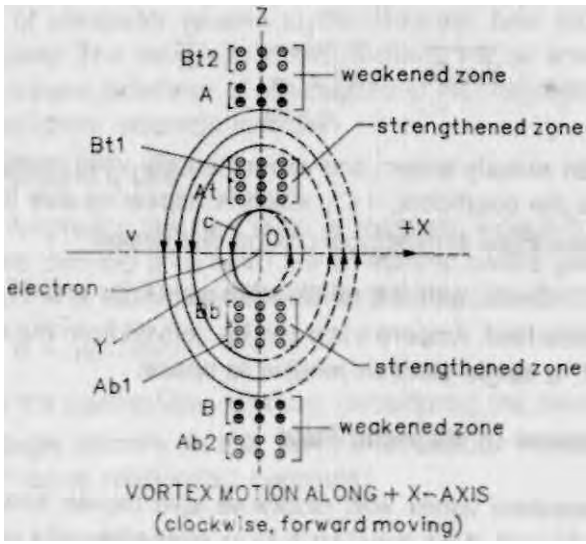


Fig. 4-9.

*The Feynman Lecture on Physics, Vol. 2, Page 40-12. Addison-Wesley Publishing Co. Inc.

origin (Fig.4.8) with anti-clockwise B, which is as per corkscrew rule. Thus, the direction of magnetic field with respect to the current is determined fundamentally from the spin direction of electron. Without a spin in the electron structure there won't be the phenomenon of either charge or magnetism.

4.8. Physical aspect of B

The B vector has the dimension of velocity, however, it does not indicate the movement of space like the velocity field vector u. Since magnetic field is created due to the reaction of space against the spin at the interface of electron, at a particular point on the circular magnetic field line, B vector indicates the velocity with which the gradient of the velocity moment at that point is transmitted along the circle of the magnetic field, though there is no real movement of space.

In Fig.4.10 magnetic field created due to number of electrons passing through the origin in succession is shown. Across each pulse of magnetic field, velocity moment gradient exists. When a bunch of electrons pass through the origin simultaneously, considering their symmetrical distribution about the X-axis, the individual pulses get smoothened out due to the superposition of the velocity moment as shown in the figure. The resultant velocity moment becomes a constant quantity with zero gradient. The resultant flux is the field (of velocity moment) produced by direct current which does not vary with time. A gradient in velocity moment is created by varying the flux. With number of electrons per unit time passing through the origin changing with time, pulses of magnetic field are produced. When the numbers of electrons are reduced, the negative pulses are transmitted out as concentric circles and it is these pulses that create gradient in the velocity moment and, therefore, B field, which when cut through a conductor placed in the field, causes magnetic induction and produces current as discussed below.

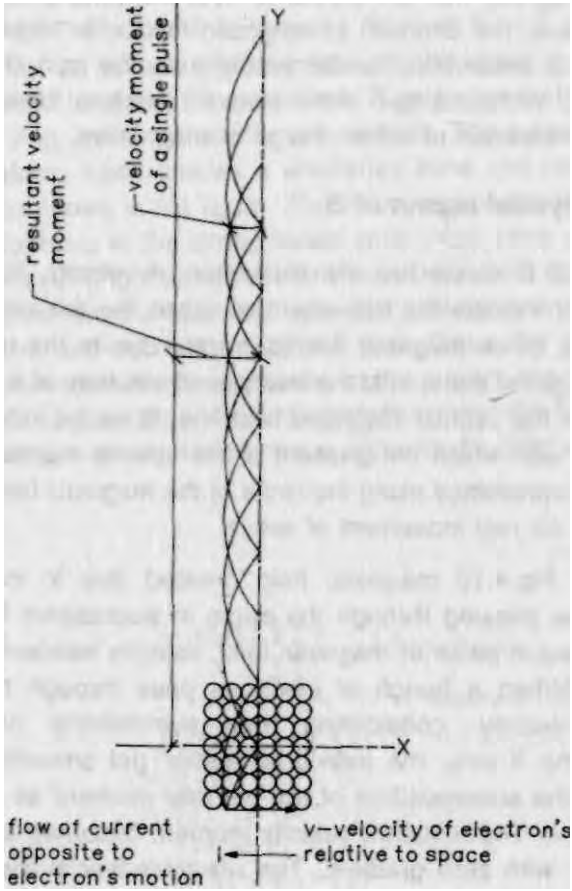

Y
velocity moment of a single pulse
resultant velocity moment
X
flow of current opposite to electron's motion
v—velocity of electron's relative to space

Fig. 4-10.

4.9. Electric Current

Consider an atom A_1 with one of its orbital electrons shown in two positions as in Fig. 4.11a. The vibration of the nucleus A_n along with the electron, (up and down the paper) will produce

magnetic fields in directions opposite to the vortices as shown. The downward B (external magnetic field) will strengthen the magnetic field between e_2 and A_1, and weaken the magnetic field between e_1 and A_1.

The electron in e_2 position has strengthened B field on right and weakened B field on left, due to which, it develops force towards left as shown. Similarly, the atom A_1, due to unequal B fields on either sides, develops a force towards right, thus weakening the bond between A_1 and e_2. The magnetic force developed on ei due to unequal magnetic fields on its either sides being towards left (to the reader), the bond between e_1 and A_1 is strengthened. Thus the electron develops a stronger bond with A_n due to external field in its e_1 position, and weaker bond in e_2 position. If A_1 is moved (alongwith the conductor) to the right relative to magnetic field, e_2 is released from the atom, and due to its anticlockwise vortex spin, will move up from the paper towards the reader, thus producing an electric current I in opposite direction, that is, flowing into the paper. The direction of current is as per Fleming's right-hand rule as shown in Fig. 4.12. The induced current produced clockwise magnetic field B which strengthens the external field B on the right-hand side (of the reader), and weakens B on the left-hand side, due to which the atom tends to move to the left, which is opposite to the motion of the conductor relative to B. The motion of conductor in the external magnetic field B, induces a current that sets its own magnetic field which has such a direction so as to produce a force to oppose the change that caused it. This explains the origin of Lenz's law.

In a conductor, the atoms with opposite spins and oppositely spinning electrons (Fig. 4.11b), when interacted with B due to the conductor motion relative to B to the left, produce current in opposite direction for which explanations are similar to the above.

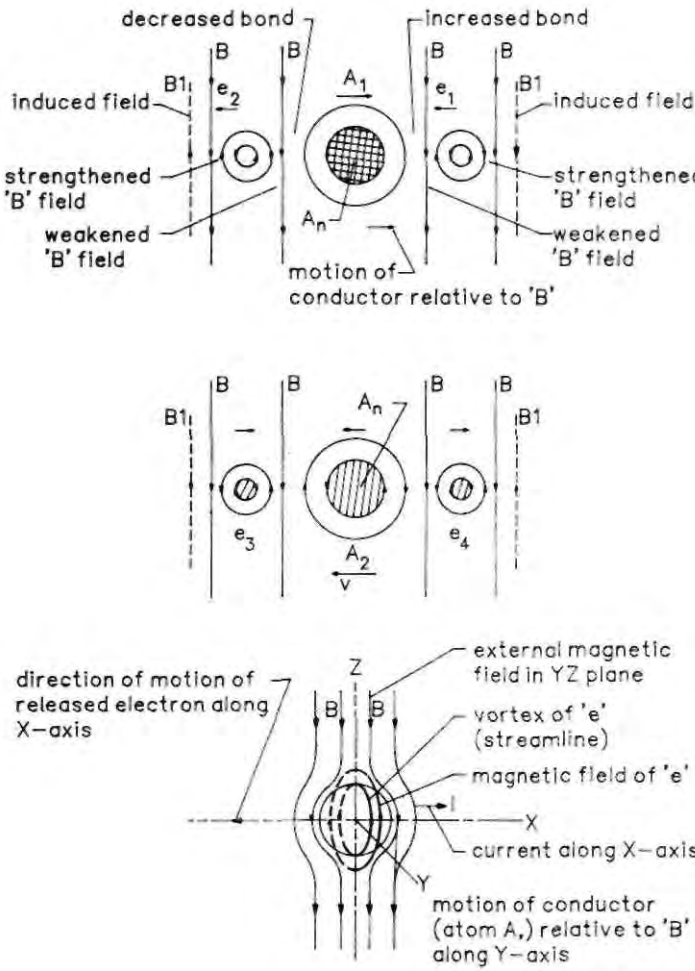


Fig. 4-12.

A copper conductor under a magnetic field repels entry of B in its interatomic spaces due to its low permeability, and therefore, the field lines pass around the conductor. For B to penetrate into the interatomic spaces, where, as discussed above, interaction with the orbital electrons and atomic magnetic fields (due

to oscillatory motion of atoms) is possible, the conductor must be moved relative to the magnetic field so that the field lines sweep through the inter atomic spaces.

With the spin directions as shown in Fig. 4.11a, if the conductor is moved to the left instead of right (as discussed above), the electron e_2 (with anticlockwise vortex spin) due to its weakened bond has some probability for release, despite the fact that the nucleus of atom A_1 follows it due to the conductor motion to the left, which is also the direction towards which e_2 is pushed by the magnetic force. This supposition is similar to the case of the atom and the electron with opposite spins in Fig. 4.11b, in which, if the conductor is moved to the right instead of left, there is some possibility of realise of e_4 with clockwise vortex spin. Since atoms with both the spins are present in a conductor, when the above supposition is made, both e_1 and e_4 have equal probability of release, and since they posses opposite spins, they move oppositely and cancel their effect of producing current as well as the magnetic field.

CHAPTER FIVE

NUCLEAR STRUCTURE

5.1. Neutron

The Limitation on the creation of only one size of stable void, which in turn produces stable fundamental mass* and stable fundamental charge as basic units, very much simplifies the theory on the structure of nuclear particles. Some general principles that follow from the insight gained into the physical nature of mass and charge, as discussed in the earlier chapters, providing guidelines and basic frame work for the development of a new nuclear theory, are as follows:

(i) All stable particles that posses mass must necessarily be constituted of the fundamental particle of matter, that is electron,

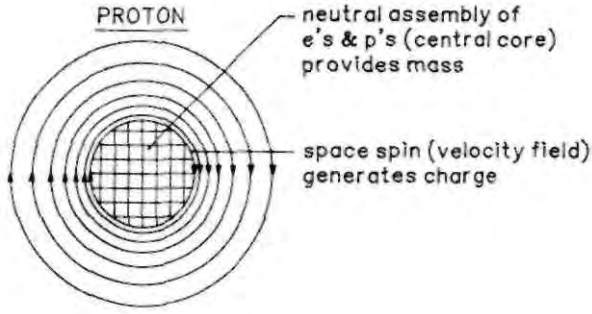
(ii) Those stable particles that are observed to be without charge like neutron, cannot possess an over all spin of ss (fig. 5.1) which, as shown before, is the basis for the overall charge property. The neutral assembly of the neutron should therefore be built with equal numbers of e's and p's, which possess opposite charge due to their opposite spins, thus cancelling the overall effects of the charge (like production of electric and magnetic fields) due to superposition of the oppositely directed velocity fields.

(iii) Particles (stable), showing the property of charge like proton, must possess space-spin enclosing the assembly

*As shown in Chapter-4, Section 4.4, the "inertial mass" or "rest mass" is a constant quantity which does not undergo any change due to motion of electron relative to space. Hence, no distinction is made between "rest mass" and "relativistic mass".

of the central core (fig. 5.1) which, being heavier than e, should be assembled out of many fundamental particles in order to account for its mass as stated in (i) above.

Keeping these principles in view, for a neutral assembly of e's and p's, a characteristic structure of two e's and two p's is



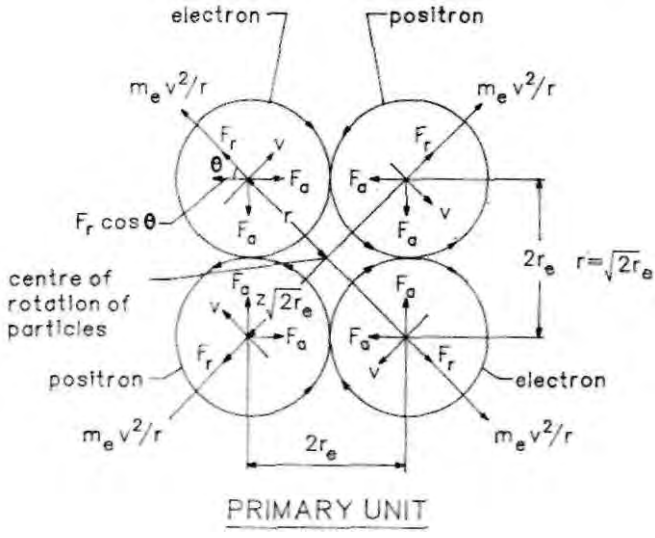


Fig. 5-2. Primary Unit

shown in Fig. 5.2. The diagonally opposite e's and p's will electrostatically repel each other, whereas, sideways, between the e and p, there will be electrostatic attraction. In addition, if the particles are also spinning relative to space, there will be additional centrifugal radial force, $m_e v^2/r$, that will add to the electrostatic force of repulsion. If the sum of the repulsive forces balance against the attractive force F_a between a pair of e and p, annihilation will be prevented, and the assembly of four particles, spinning around a common centre of assembly, will be stable. This assembly is hereafter referred as "primary unit".

Consider a spherical assembly of equal numbers of e's and p's with total of n particles. The volume of the assembly will be $(4\pi r_e^3/3)^n$. The radius of the spherical assembly with a close packing of n particles, will be,

$$r = (n)^{1/3} r_e \qquad (...5.1)$$

Neutron has the mass of $1839m_e$. However, since it is a neutral particle, it should have equal numbers of e's and p's to bring about the neutrality through the super position of the velocity fields, and, therefore, its mass is taken as $1838m_e$, with 919 e's and 919 p's in a spherical assembly built with the primary units described above.

Within a primary unit, an electron, with r as the radius of its rotation, will be subjected to an outward radial force $m_e v^2/r$, (fig. 5.2). When the minimum possible spacing between the centres of an e and p is $2r_e$, the diagonal distance between the similar particles is $2\sqrt{2}r_e$, and at maximum possible speed c is, $m_e c^2/\sqrt{2}r_e$. Expressing m_e as, $4\pi r_e^3 c/3$, the maximum value of the centrifugal radial force F_c will be, $(4\pi/3\sqrt{2})r_e^2 c^3$, which will have a component in opposition to F_a, equal to $F_a \cos 45°$, which is, $(2\pi/3)r_e^2 c^3$. The value of F_a, when q_e is expressed as $4\pi r_e^2 c$, will be, $(c/4\pi)(4\pi r_e^2 c)^2/4r_e^2$, which is, $\pi r_e^2 c^3$. Also, the repulsive

force F, between e's and p's along the diagonal being, $(c/4\pi)\,(4\pi r_e^2 c^2/(2\sqrt{2}.r_e)^2$, which is, $(\pi/2)r_e^2c^3$; it will have a component $F_r\cos 45°$ in opposition to F_a, and equal to $(\pi/2\sqrt{2})r_e^2c^3$. The net force on the electron in opposition to F_a is:

$$F_c \cos 45° + F_r \cos 45° = \frac{2\pi r_e^2 c^3}{3} + \frac{\pi}{2\sqrt{2}} r_e^2 c^3 = \pi r_e^2 c^3 \frac{(8.6)}{(8.4)},$$

which being approximately, $\pi r_e^2 c^3$, is equal to F_a. It is thus seen that without the rotation of the particles of the primary unit about their centre at speed approaching c, annihilation between e and p can not be prevented.

A neutron, with 1938 particles closely packed within a spherical assembly, will have from 5.1, a radius,

$$r_n = (1938)^{1/3} r_e = 12\, r_e$$

In Fig. 5.3, the particles of the primary units, in addition to the rotating motion around the centre of the four particles (discussed above), are shown to have additional circular motion around the axis of the spherical assembly of neutron. A diametrical plane section consisting of only two layers of the particles is shown in Fig. 5.3. Since the particles are translating relative to space along their spin axes, magnetic field will be produced which will bind e's (and also p's) and produce repulsion between e's and p's. The e's and p's, with opposite spins, will rotate around the axis of rotation in opposite directions. The disc of radius $12r_e$, as calculated above, will have three rings of e's and p's alternatively placed. The inner most electron, rotating at maximum speed c around a radius r_e, will develop an outward force

$m_e c^2/r_e$ which will tend to disrupt the assembly. For the stability of the assembly, the magnetic field produced at the centre by the outer two rings of the rotating electrons should have such a strength that the outward force $m_e c^2/r_e$ on the innermost electron is nullified. If the magnetic field on the innermost electron rotating at speed c is B, then,

$$Bq_e c = \frac{m_e c^2}{r_e}$$

$$B = \frac{m_e c^2}{r_e q_e c} = \frac{(4\pi r_e^3 c/3)c^2}{r_e(4\pi r_e^2 c)c} = \frac{c}{3} \quad (5.2)$$

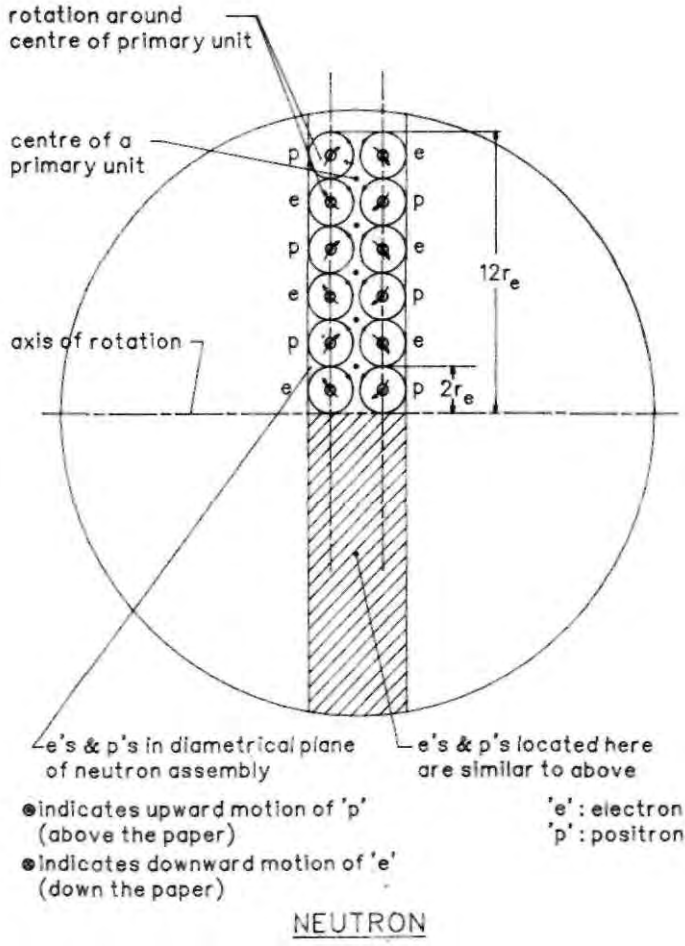

rotation around centre of primary unit
centre of a primary unit
axis of rotation
p
e
$12r_e$
$2r_e$
e's & p's in diametrical plane of neutron assembly
e's & p's located here are similar to above
●indicates upward motion of 'p' (above the paper)
●indicates downward motion of 'e' (down the paper)
'e' : electron
'p' : positron
NEUTRON

Fig. 5-3. Neutron

If the current produced due to rotation of e's in the outer ring is i_0, the radius of rotation being $9r_e$, the magnetic field B_0 produced at the centre will be,

$$B_0 = \frac{\mu_0 i_0}{2\pi(9r_e)}, \quad (5.3)$$

where μ_0 is the permeability constant of the vacuum. Suppose that the rotational speed of the particles falls inversely as the radius of rotation, as in case of an irrotational vortex of space, discussed in chapter 2, the maximum speed being c at radius r_e for the innermost e. The speed of rotation for the electrons in the outer ring will be $v_0 = c/9$. The frequency of rotation of electrons will be: $f_0 = (c/9)\ 2\pi 9r_e = c/162\pi r_e$. The ring has $2\pi 9r_e/2r_e$, that is, 9π electrons in it. The current due to the ring of electrons will be,

$$i_0 = 9\pi\ (q_e f_0) = 9\pi\ (4\pi r_e^2 c)\ c/162\pi r_e = 2\pi r_e c^2/81.$$

From 5.3 and the relationship, $\mu_0 = 1/c$, considering spherically symmetric charge,

$$B_0 = \frac{(1/c)\ (2\pi r_e c^2/81)}{18\pi r_e} = c/81 \quad (5.4)$$

Now, consider the inner ring which will have rotational speed c/5, and frequency of rotation $f_i = (c/5)/2\pi 5r_e = c/50\pi r_e$. The inner ring will have $2\pi 5r_e/2r_e$, that is, 5K electrons in it.

$$i_i = 5\pi(q_e f_i) = 5\pi(4\pi r_e^2 c)\ c/50\pi r_e = 2\pi r_e c^2/5,$$

The magnetic field $= B_0 + B_i = \frac{c}{81} + \frac{c}{25} \sim \frac{c}{20}$.

the magnetic force on the central electron due to the inner and outer rings of e's and pulling it radially out will be,

$$F_B = q_e\alpha(c/20) = 4\pi r_e^2\ c^3/20.$$

The two rings of positrons will magnetically push the central electron with radially inward force F_B which will have its equal

reaction since the central electron cannot be displaced radially from its position. Thus the total outward magnetic force is double of F_B, that is, $4\pi r_e^2 c^3/10$. The radially inward centripetal force which keeps the electron rotating in its shortest orbit at maximum speed c, is $m_e c^2/r_e$, that is, $4\pi r_e^2 c^3/3$ and against the magnetic force $4\pi r_e^2 c^3/10$ as calculated above. The assembly of e's and p's in the central plane are thus held in a stable configuration with the maximum possible numbers of fundamental particles.

The superposition of the magnetic fields produced by the three rings of currents will produce, in the central zone, maximum strength, which will fall off in the outer rings. Accordingly, the numbers of the primary-units, that are bound, are maximum along the horizontal axis due to magnetic attraction, and reduce along the vertical axis due to the falling rotational speeds of the central particles, and, therefore, reduced magnetic attraction. The assembly of the particles will thus have spherical geometry.

The opposite spins of e's and p's will give zero overall charge and, therefore, zero magnetic moment to the neutron. Also, since the rotational directions around the neutron's axis of rotation of e's is opposite to that of p's, the neutron should also have zero angular momentum.

The maximum possible field, c^2/r_e, on e's and p's forming the surface of neutron, will make it the most penetrating particle into the material media.

5.2. Proton, Hydrogen Atom

The proton is shown in Fig. 5.1, in which a neutron, which is the core, is enclosed within a space-spin, which generates the electric charge on the core surface. Since the radius of the neutron, $r_n = 12r_e$, from the relationship, ur = constant, in an ir-rotational vortex, the tangential velocity of space u_p (in the

diametrical plane) at the surface of the core (neutron) will have the relation.

$$u_p\, r_n = c r_e,$$

where c is the tangential velocity at the interface of the electron vortex with the void radius r_e.

$$u_p = c r_e / r_n = c r_e / 12 r_e = c/12 \qquad (5.5)$$

The electric charge q_p, developed due to the space-spin on the core surface is derived similar to the charge- equation for the electron,

$$q_p = \frac{\pi}{4}(4\pi r_n^2 u_p) = \frac{\pi}{4}\left[4\pi (12 r_e)^2 \cdot \frac{c}{12}\right]$$

$$\approx 12\pi^2 r_e^2 c, \qquad (5.6)$$

which shows that the electric charge of proton is 12 times the electronic charge. A combination of the proton and electron (Hydrogen Atom) does not show an overall charge property due to the cancellation of their magnetic momenta (Fig. 5.4) as shown below.

The orbiting electron is that far spaced so that velocity field in its vortex reduces to c/12, at the surface of the (neutron) core.

$$c r_e = (c/12) r$$

$$r = 12 r_e \qquad (5.7)$$

The magnetic moment of the orbiting electron is due to its intrinsic spin and also due to its orbital motion at velocity v. Total magnetic momenta of the orbital electron,

$$\mu_e = q_e c r_e + q_e v\,(12 r_e + 12 r_e)/2$$

$$= q_e r_e (c + 12v) \qquad (5.8)$$

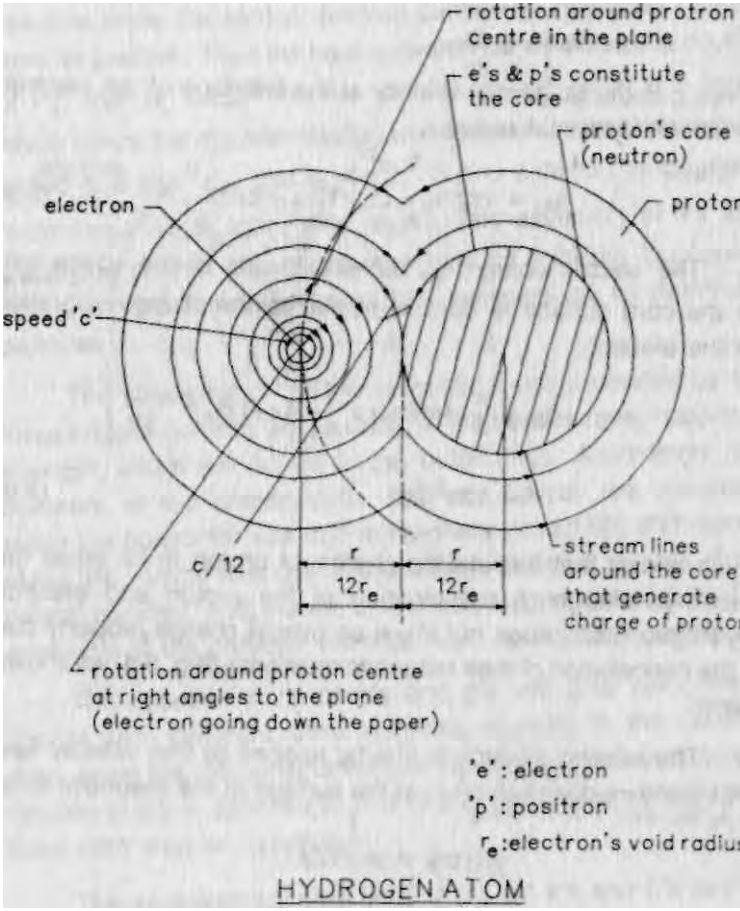


Fig. 5-4. Hydrogen Atom The magnetic moment of the proton,

$$\mu_p = q_p (c/12)\, 12r_e = 12q_e c r_e \qquad (5.9)$$

Equating the above two magnetic momenta for the cancel-

lation of the electric charge effect of the proton vortex and the orbiting electron,

$$q_e r_e(c + 12v) = 12 q_e c r_e$$

$$v = (11/12)c \qquad (5.10)$$

The electron's orbital radius is $24r_e$, which is about 10^{-9} cm, where $r_e = 4 \times 10^{-11}$ cm, and its speed of the orbital rotation is about 0.9c from (5.10). The magnitudes of the orbital radius and the speed of rotation as derived above can be checked as below.

The electric attraction between the orbital electron and the charged core should be equal to the outward centrifugal force due to the rotation of e.

$$\frac{m_e v^2}{24 r_e} = \frac{c}{4\pi} \frac{12 q_e^2}{(24 r_e)^2}$$

Expressing m_e and q_e in terms of r_e and c, and with v = (11/12) c, from (5.10),

$$\frac{(4\pi/3) r_e^3 c\, (11/12)^2 c^2}{24 r_e} = \frac{c}{4\pi} \frac{12(\pi/4)^2 (4\pi r_e^2 c)^2}{(24 r_e)^2}$$

$$\frac{r_e^2 c^3}{7.2} = \frac{r_e^2 c^3}{6.2},$$

which shows close equality of the two forces that keep the stability of the orbital electron in a fixed orbit, and proves that the values of the orbit radius and the orbital speed derived above are fairly accurate.

With the high rotational speed of 0.9c in the orbit, the electron takes a time of, 2*pi*10^{-9}/0.9c, that 0.2 x 10^{-18} sec. to complete one orbit, and thus provides a shield to the core. The interactions between the velocity fields of the oppositely spinning vortices of the electron ad proton, maintain the assembly together with no loss from the system, since the vortices are

formed in the non-viscous, incompressible and continuous ideal fluid, which is the space itself. The acceleration of the electron, due to its movement in a circular orbit does not dissipate its energy through the emission of light- photons as conventionally believed. (The production of light, as discussed in Section 3.3, is due to decay or decrease of the gravitational fields rather than the emission of energy from the charge in acceleration). The spacing between the centres of the orbital electron and the neutron core is maintained constant, as stated before, due to the requirement of the equality of the velocity field of the two vortices at the core surface.

5.3. Nuclei of atoms larger than Hydrogen

While the electrons (and positrons), as fundamental particles of matter, build neutron, which also forms the proton core, the neutron and proton, as discussed below, are the elementary building blocks of the nuclei (Fig. 5.3). Consider a nucleus with maximum possible mass-numbers, to have n numbers of protons. Since it is known that in Uranium, which has a heavy nucleus, the ratio of the neutrons to the protons is about 1.586, let the numbers of the neutrons in the limiting nucleus considered be 1.6n. If the radius of the compact spherical assembly of the particles is r_n,

$$(4\pi/3)r_n^3 = n(1 + 1.6)(4\pi/3)(12r_e)^3$$

$$r_n = (2.6)^{1/3} n^{1/3} 12r_e \qquad (5.11)$$

The above computation does not provide any space medium within the spherical assembly of the limiting nucleus for the vortices of each proton which is external to the proton core (neutron) of radius $12r_e$. Also, if the entire space medium within the spherical assembly is used to accommodate the neutron and the proton cores only, the production of the electric field in the absence of the space medium will not be possible. For the creation of the electric field and definite pattern of the arrangements and motion of the protons and neutrons (discussed further), the radius

derived above is doubled in its value, as an approximation

$$r_n = 2(2.6)^{1/3} n^{1/3}\ 12r_e \qquad (5.12)$$

The electrostatic repulsive force F_r, on a proton located at the surface of the nuclear assembly, will be

$$F_r = \frac{c}{4\pi} \frac{(n12q_e)\ 12q_e}{[2(2.6n)^{1/3}12r_e]^2} \qquad (5.13)$$

The circular vortex, enclosing the nucleus, possesses an inward force, $F_a = m_n u_n^2/r_n$, where, m_n, is the mass of the nucleus, and, u is the tangential velocity of space at the nuclear surface in the transverse diametrical plane. Since m_n is proportional to the volume of the nucleus, $m_a \propto r_n^3$. Also, as discussed in case of the proton vortex in Section 5.2, spin at the nuclear surface, $u_n \propto 1 / r_n$. therefore, the inward force developed due to space-spin, $F_a \propto r_n^3 (1/r_n)^2 r_n$, a constant quantity for all nuclei, and independent of the mass and radius. In the fundamental vortex of electron, $F_a = m_e c^2/r_e$, which, therefore, will have the same value for all the nuclear vortices that, with this inward force, bind the nuclear particles externally, and oppose the repulsive force F_r due to the protons in the nucleus. Equating the two opposite forces to determine the maximum numbers of protons that are possible in the largest nuclear assembly,

$$F_r = F_a,$$

which from (5.13) becomes,

$$\frac{c\, n\, 144q_e^2}{4\pi 4(2.6)^{2/3}\, n^{2/3}\, 144r_e^2} = \frac{m_e c^2}{r_e}$$

Substituting, $(\pi/4)\, 4\pi r_e^2 c$, and $(4\pi/3) r_e^3 c$, for m_e,

$$\frac{c\, n\, 144(\pi^2/16)\, 16\pi^2 r_e^4 c^2}{16\pi(2.6)^{2/3}\, n^{2/3}\, 144r_e^2} = \frac{4\pi r_e^3 c^3}{3r_e}$$

$$n^{1/3} = 4.11$$
$$n = 70 \qquad (5.14)$$

With the assumption made above, due to which the value of r_n of (5.11) was doubled for the creation of that electric field, the limiting size of the nucleus should have not more than 70 protons. However, it is known that the largest nucleus of curium has 96 protons. The discrepancy could be in the assumption of doubling the nuclear radius in the above calculations to accommodate the spin vortices of the protons, and definite pattern of motion of the particles within the nucleus. For, if the nuclear radius from (5.11) is increased by a factor of 2.1 rather than 2, the numbers of the protons in the assembly of the limiting nucleus will increase to 90. Also, the additional force, not accounted in the above calculations, is the magnetic force of attraction between the protons arising due to their circular movement (relative to space) within the nuclei. The magnetic force of attraction will counteract the Coulomb's repulsive force within the nucleus (computed above) and will assist the external binding force arising from the space spin, thus, increasing the numbers of the protons that can exist in stable configuration in the limiting nuclei to a value slightly greater than 90. It gets evident that stable nuclei can not exist in the universe with the number of protons more than, say, hundred.

The basic problem of nuclear theories as to what kind of nuclear force holds the nuclear protons with similar charge together in the nucleus is solved by showing that the space-spin, external to the nuclei, provides not only the electric charge to the nucleus but, also generates an inward force that opposes the splitting force of the electrostatic repulsion between the protons within the nucleus. The magnetic force of attraction between the protons, due to their motion within the nucleus, will also bind the protons.

The less the numbers of protons in the nucleus (as in the atoms of lower atomic numbers), the higher is the stability, as

the electrostatic repulsive forces are comparatively lower than the external binding force due to space-spin, which, as shown before, remains constant on all the nuclei.

5.4. Mechanistic view

The model of the hydrogen atom in which the electron revolves around the core of proton due to the fields and the forces developed with the rotation of the substantial space, answers the questions that arise from the mechanistic angle on atomic structure, whereas, it becomes rather difficult to physically conceive today the working within the atom with the current concepts of physics. According to Darrow*, "A hydrogen atom, with its electron revolving in a circular orbit about its nucleus, can be regarded as a wheel. It is a peculiar kind of wheel, since it has no spokes and the rim is vacant except for the small region occupied by the electron, but it possesses the major property of a wheel: angular momentum". As per Darrow, the region occupied by election is not vacant, whereas the rest of the region of electron orbit is vacant. The author holds the opposite view in which the region occupied by the electron is a void, and the rest of the region is pervaded with the dynamic state of space. Also, the 'spin' of electron has mechanistic explanation as shown with the derivation of "h" in Section-3.2, n contrast to the current knowledge on electron structure. Darrow further states: "The electron, besides revolving around the nucleus, possesses an angular momentum of its own, and we link it therefore to a wheel, it may be visualized as a rigid body spinning upon its axis, but this is a rather dangerous analogy, for it leads one to inquire what the electron's angular velocity is, and no one has ever been able to answer this question-indeed, it is very likely unanswerable". In the electron structure developed earlier, it is the spherical interface of the void that spins at the limiting velocity and generates velocity fields that impart highest rigidity' to the

*Karl K. Darrow, The Quantum Theory, Scientific American, March 52, Vol. 186, No. 3, 47-54.

electron. The modern trend, in which the theories of quantum phenomena depart from the physical explanations and discredit mechanistic approach, will undergo radical revision when the electron structure is developed on the lines proposed here.

On the picture of the basic nature of matter, Erwin Schrodinger remarks*, "Thus the subject of this article is in fact the total picture of space-time reality as envisaged by physics. We have to admit that our conception of material reality today is more wavering and uncertain than it has been for a long time. We know a great many interesting details, learn new ones every week. But to construct a clear, easily comprehensible picture on which all physicists would agree - that is simply impossible. Physics stands at a grave crisis of ideas. In the face of this crisis, many maintain that no objective picture of reality is possible. However, the Optimists among us (of whom I consider myself one) look upon this view as a philosophical extravagance born of despair. We hope that the present fluctuations of thinking are only indications of an upheaval of old beliefs which in the end will lead to something better than the mess of formulae which today surrounds our subject". The matter of our day today experience is the final product from the fundamental velocity field produced due to space-motion which alone is the basic reality. Matter is only a partial reality, since it contains within each of its elementary particle, a fieldless void, and our senses, even when aided with the experimental tools, can recognise only the partial truth of matter. The discovery of the underlying reality which generates matter showed be the theoretical approach, and inference should be drawn made by seeking the answers to the 'whys' of the basic behaviour of matter; and it is only then that the different phenomena apparently disconnected will be seen to originate from a common source:dynamic plenum of the substantial space.

*What is Matter? Scientific American September 1953, Vol. 189 No 3, pp. 52-57.

5.5. Ionization Energy

Consider an average atom in which the radius of the outermost orbital electron is say 10^{-8} cm, which is about 10 times larger than the smallest atom of hydrogen. Let us also suppose that the rotational speed of the outer orbital electron is one tenth of the speed of light, as compared to 0.9c in hydrogen atom. The inward centripetal force on electron (equal to electric force of attraction) rotating it in the orbit will be $m_e\ (c/10)^2/10^{-8}$ dynes. In order to extract the electron out, let us consider a minimum radial displacement of the above force up to the elementary length r_e. The energy required will be $m_e\ (c/10)^2\ r_e/10^{-8}$, which is, 3.6×10^{-11} erg or 20 electron volts. The energy required to ionize a hydrogen atom is 13.6 electron volts. The ionisation energy varies directly with the square of the orbital velocity and inversely with the orbital radius of the electron in the atom.

5.6. g-factor of electron

An accurate calculation of g-factor of static electron can be done as follows:

If μ and J are the magnetic moment and angular momentum of a static electron (not in the orbit) due to its intrinsic spin and charge,

$$\mu = -g\left(\frac{q_e}{2m_e}\right)J,$$

where g is a dimensionless constant whose magnitude for electron is 2 as per quantum mechanics.

From (3.2), angular momentum (denoted in the above equation as L) is $(4/5)m_e c r_e$. The magnitude of μ can be accurately determined as follows:

In Fig. 2.4, as discussed in Section 2.3, the elemental

charge $dq = dA\omega r_e \sin\theta$. The magnetic moment of this elemental charge is defined as,

$$d\mu = dq\,(\omega r_e \sin\theta) r_e \sin\theta.$$

Total magnetic moment due to spin of electron,

$$\int_0^{\pi} d\mu = \int_0^{\pi} (2\pi r_e \sin\theta\, r_e d\theta)\ (\omega r_e \sin\theta)\ (\omega r_e \sin\theta) r_e \sin\theta$$

$$\mu = \int_0^{\pi} 2\pi c^2 r_e^3 \sin^4\theta d\theta$$

$$= (3/4)\, q_e\, c r_e.$$

Substituting the above values of μ and J in the above equation,

$$(3/4)\, q_e\, c r_e = -g\left(\frac{q_e}{2m_e}\right)(4/5) m_e c r_e$$

$$g = 1.88.$$

5.7. $\nabla^2\varphi = \rho/\varepsilon_0$

"No one has yet made up a theory of electricity for which, $\nabla^2\varphi = \rho/\varepsilon_0$ is valid for all distance, no matter how small leads to absurdity of its own (the electrical energy of an electron is infinite) - absurdities from which no one yet knows an escape" says Professor Feynman (The Feynman Lectures on Physics, Vol. II, page 12-13, Addition-Wesley Publishing Company). As discussed in Section 3.2, $\frac{dE}{dr}$, which is "gradient of E" or ∇E is the inward acceleration field vector, whose maximum value on the interface of electron is c^2/r_e. Since , $E = \nabla\varphi$, $\nabla E = \nabla^2\varphi$. Also, ρ, the "electric charge density" for the void of electron itself will be, $(\pi/4)\, 4\pi r_e^2\, c/(4\pi r_e^3/3)$, which is $3\pi c/4r_e$. From (2.7), $\varepsilon_0 = \pi/2c$. Substituting these values,

$$\nabla^2\varphi = -\rho/\varepsilon_0$$

$$-\frac{c^2}{r_e} = -\frac{3\pi c}{4r_e}\,\frac{2c}{\pi} = -\frac{3}{2}\,\frac{c^2}{r_e}$$

which shows the equality of either sides, except for the coefficient 3/2, and proves the relationship, $\nabla^2\varphi = -\rho/\varepsilon_0$ valid up to a minimum radius which is not less than r_e.

CHAPTER-SIX

ON TIME

The sphere of absolute vacuum, (fig.3.6), is the most fundamental state of the universe when there is no matter anywhere in it. However, even in this basic state, the universe must be dynamic and possess movement, so that it exists as the energy substratum, and is capable of creating matter in those regions where the motion of the vacuum tends to exceed light speed. The speed of a space point relative to its surrounding points is the fundamental aspect incorporated in the design of the universal space, and from this basic phenomenon of "changing position of space points" arises the very "concept of time". The massless, nonviscous, incompressible, continuous, homogeneous and dynamic space being itself energy fundamentally, the dissipation of energy due to motion, as it happens in a material medium under movement, is inapplicable for space medium. Though there could be cosmic energy transfer form one region of space to other zones within the universe, yet, the total energy of the spherical universe is a constant quantity, since the very existence of the fields in the infinite void exterior to the universe cannot be there and hence no transmission of energy outside the sphere of the universe is ever possible. The spherical shape of the universe has its central position relative to which all spatial points possess movements, and which therefore, is the absolute point of reference. Since the dynamic state of space is eternal, time too, is basically eternal. In the matterless universe, there is neither mass nor gravity field, and hence no electromagnetic field (light). All that exists is the churning vacuum, velocity fields. With the creation of the fundamental particles of matter, the elementary length r_e (void radius of electron) is created, and with this, the minimum unit of time r_e/c is produced. Also the maximum time is a ratio of universal radius R and c, that is, R/c, is now

available. The material Phenomena like, creation of fundamental matter, stars, galaxies, planets, satellites, and their interactions and motion take place within the limits of the above minimum and maximum time intervals.

By detailed analysis it can be shown that the motion of the universal matter, formed as galaxies during its travel from the central regions of he universe towards its spherical boundary, will eventually reverse due to the assymmetry of forces as the galaxies reach nearer to the boundary. As the galaxies approach closer during their backward motion towards the universal center, their collisions will be unavoidable and disintegration, annihilation will be predominant, thus bringing to an end one complete comic cycle of creation and annihilation during a time period of 2 R/c, that is, about $3x10^{20}$ sec. The universal cycles of creation and annihilation will repeat eternally.

Our natural intution that time shall never end is borne out of the basic interrelationship between dynamic space and time. The 'self, that generates this intution, is itself a product of pure space, since there is no entity in the universe other than the fundamental substratum of space, which must generate the will, consciousness, time, energy and matter that are the aspects of the universal God. The "time" of our day today experience emerges from the changes in the positions of material bodies, and also changes in their structure due to the inevitable field interactions causing assembly, decay and disintegration. Since all the material phenomena originate from space, the time related with changes in the material environment is also a product form the primary time inherent in the dynamic substratum of space. Time is real, since space and its motion are real. Time is absolute since space is absolute.

Chapter 7

GENESIS OF FREE POWER GENERATION

Introduction

As per Lenz's law the electromotive force (EMF) induced in a conductor has such a direction that the current produced by it opposes any flux change. More precisely, in a specific case of a conductor moving relative to magnetic field, the magnetic field produced by the current due to the induced EMF in the conductor interacts with the external magnetic field that initially induced the EMF, and thereby produces a net force on the conductor opposing its movements across the magnetic field. If the configuration of the conductor through which the current flows is made in such a way that the magnetic fields produced by the currents in the above two conductors cancel each other partially (if not fully), then there is a way to beat the Lenz's law due to which mechanical power required to move the conductor across the magnetic field to generate electrical power will get proportionally reduced.

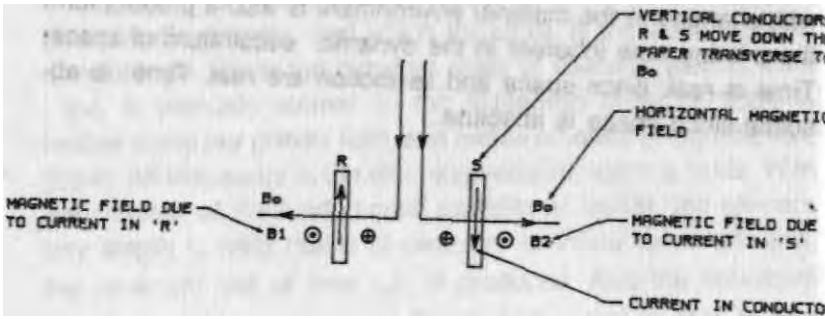


Fig. 1.

The design of the modern dc generator has difficulties in achieving the above configuration of the conductors since the generating element is the rotating conductor within the generator, whereas, the entire outer circuit is a stationary loop connected to the loads. It is shown below as to how the physical constraints in achieving the desired relative dispositions of the conductors can be overcome, and Lenz's law can be partly made ineffective. With the efficiency increase to higher than unity in the above scheme, the question arises on the source of additional power. Through brief discussion it is shown that only with an alternate theory, which postulates generation of matter from space medium, satisfactory explanations for over-unity machines can be had.

Non-expenditure of External Energy in the Generation of Electromotive Force

In an electric conductor moving relative to a steady magnetic field, as shown in Fig. 1, EMF is induced. The fundamental explanation for the EMF to produce current when the circuit is closed as currently believed is that the conductor has free electrons that account for the property of conductivity, and these electrons experience in succession a push (magnetic force) in

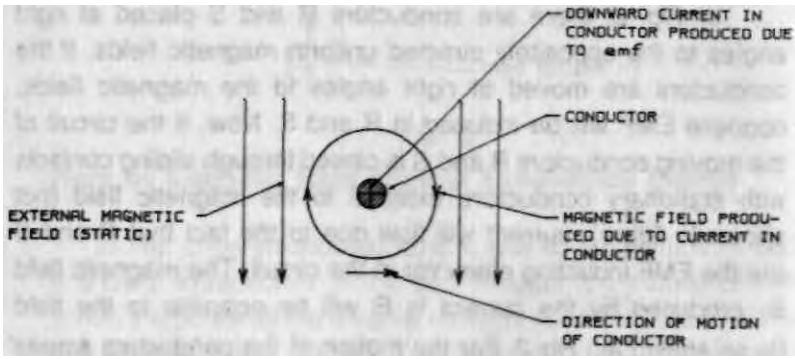

DOWNWARD CURRENT IN CONDUCTOR PRODUCED DUE TO emf
CONDUCTOR
EXTERNAL MAGNETIC FIELD (STATIC)
MAGNETIC FIELD PRODUCED DUE TO CURRENT IN CONDUCTOR
DIRECTION OF MOTION OF CONDUCTOR

Fig. 2.

one direction due to the induced EMF in the conductor. The EMF is defined as the tangential force per unit charge in the conductor integrated around the circuit. Thus, each electron in the conducting circuit receives energy which is directly proportional to the product of the magnetic force on the electron and its velocity. With the above definition of EMF and the magnetic force on the electron, it can be shown that an electric generator, with no-load induced EMF, E, and load current I, will deliver power equal to EI.

Consider the case of an ideal generator with permanent magnets for excitation which, when run on no-load, will not consume power towards windage and friction losses and yet EMF will be induced in its conductors, Since the induction of EMF in an ideal generator does not require power, the electrons of the circuit conductors for the flow of current when the circuit is closed can not receive energy from EMF for the successive push on free electrons as stated earlier. The agency for the flow of current in a circuit is no doubt the presence of EMF in the circuit but, since the EMF itself has not received from the prime-mover any energy during induction, the explanation for the origin of the force on electrons for the flow of current has to be found elsewhere.

Electrical Generation at Over-Unity Efficiency

In Fig. 2, there are conductors R and S placed at right angles to the oppositely directed uniform magnetic fields. If the conductors are moved at right angles to the magnetic fields, opposite EMF will be induced in R and S. Now, if the circuit of the moving conductors R and S is closed through sliding contacts with stationary conductors external to the magnetic field (not shown in figure), current will flow due to the fact that R and S are the EMF inducting elements in the circuit. The magnetic field B_1 produced by the current in R will be opposite to the field B_2 as shown in Fig 2. For the motion of the conductors across B_0 power is needed because the fields B_1 and B_2 have increased

the original field strength B_0 on one side of the conductors and decreased the field B_0 on the other side. If, however, the conductors R and S are sufficiently close to each other, B_r and B_2 will superpose and cancel each other sufficiently, thereby reducing the power required by the prime mover to push the conductors against the magnetic field and increasing the efficiency of the generator to higher than unity. In an ideal case, if the fields B_1 and B_2 from R and S can be made to superpose each other to the maximum possible extent, it will lead to the phenomenon of free power generation. It is thus seen that the modern view, as per which a generator has to be given energy by its prime mover so that the EMF generated in it can impart energy to the free electrons of the circuit conductor for the current to flow is a suspect and a debatable point.

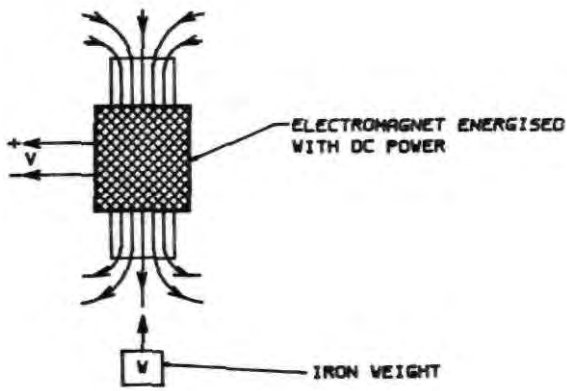
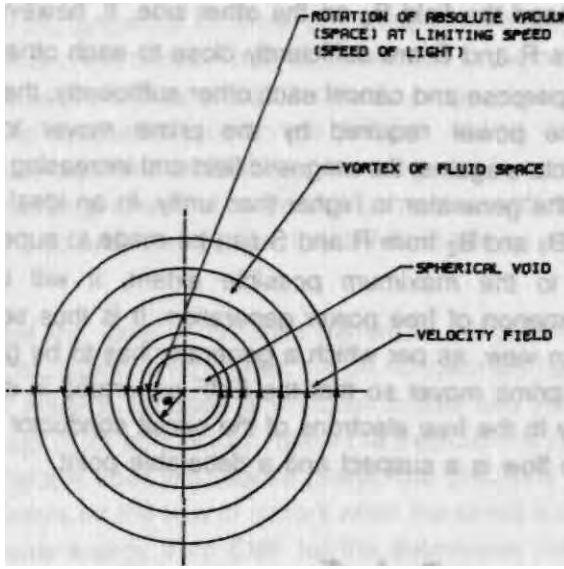


Fig. 3.

Work by Magnetic Field Without Expenditure Energy

In Fig. 3, an electromagnet that can lift magnetic iron blocks is shown. Irrespective of the fact whether the blocks are lifted or not, the power to the magnet remains constant, and this shows that work is being done by the magnetic field of the magnet without the flow of the corresponding energy (in addition to the


ROTATION OF ABSOLUTE VACUUM (SPACE) AT LIMITING SPEED (SPEED OF LIGHT)
VORTEX OF FLUID SPACE
SPHERICAL VOID
VELOCITY FIELD

NOTE:

1) ABSOLUTE VACUUM WITH NON-MATERIAL PROPERTIES (INCOMPRESSIBILITY, ZERO-VISCOCITY, CONTINUITY & MASS-LESSNESS) OF AN IDEAL FLUID

2) FIELDLESS, ENERGYLESS, SPHERICAL VOID, CREATED DUE TO ROTATION & BREAKDOWN OF ABSOLUTE VACUUM

3) SPEED OF ROTATION OF SPACE FALLS OFF INVERSELY AS DISTANCE FROM THE CENTRE OF VOID

4) RADIUS OF SPHERICAL VOID $r_o \simeq 10^{-11}$ cm

ELECTRON STRUCTURE

Fig. 4.

constant power for magnetic excitation) from any external source. Further, the strength of the magnetic field due to work being done in lifting the blocks does not deplete. The iron blocks raised to some height gain in gravitational potential but that is due to gravity field of the earth and not connected with the magnetic field system. Thus, it is possible to do work through magnetic field without any loss of energy of the magnetic field itself. It is on similar lines that the magnetic field in a generator pushes electrons to one end of the rotating conductor thus forming positive and negative polarities and inducing EMF, and in this process, though the electrons are being driven by the magnetic field, there is no depletion of the magnetic field strength of the excitation system of the generator. In view of the foregoing discussions, instead of assuming that EMF induced in a generator transfers its energy to push free electrons of the circuit conductor for the flow of current, following alter-native explanation is given.

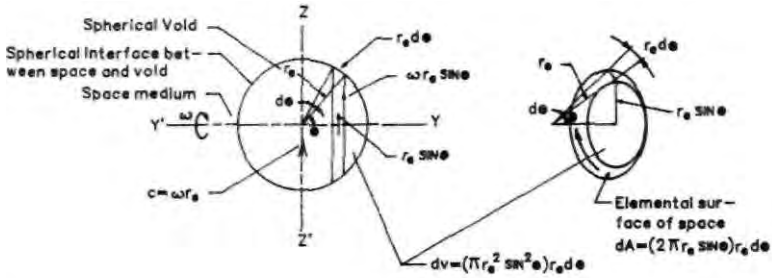
Non-transfer of Energy from Electromotive Force to Electric Current

The positive polarity of a generator has atoms that have lost their orbital electrons due to induction of EMF and, therefore, being positively charged, electrically attract loosely bound outer orbit's electrons of the neighbouring neutral atoms of the circuit conductor when the output switch is closed. This process of electric attraction of electrons by the positively charged neighbouring atoms proceeds from one atom to the next throughout the circuit. The atoms of the circuit due to the above transfer of the electrons successively change from neutral to positively charged states and back to neutral and so on as the electrons flow is continuously maintained to positive terminal and, further, in the whole circuit. The electric attraction of the electrons by the positively charged atoms does not lead to the deficit of the electric field strength of the positively charged atoms, just as it happens in the case of attraction of the iron blocks from the electromagnet discussed before, where the strength of the mag-

netic field is not depleted. Therefore, it can be concluded that the flow of electric current does not require energy from the EMF to be imparted to the free electrons.

Fields are Various Conditions of Velocity and Acceleration of the Medium of Space

The reason for gravity, electric and magnetic fields to do work in certain phenomena without reduction in their field strengths can be found in a new theory of space, matter and energy as per which the electron, which produces electric, magnetic and gravity fields, has in its structure (Fig. 4) a non-material (non-viscous, incompressible, massless, continuous) fluid, which itself is the absolute vacuum. It is the rotation of the absolute vacuum (space) at its limiting speed (equal to light speed, c) that creates stable electron. The velocity field produced due to spinning of space is the most fundamental state of cosmic energy. Since the medium of space is postulated to be non-viscous, the strength of the velocity fields in the structure of the electron does not change even when the electron is in motion and, therefore, the electron exists eternally with space spinning at maximum speed (Fig. 5), and without any loss of mass, charge, or energy from its structure eternally till it gets annihilated (Fig. 6) by its opposite particle positron. It has been shown that from the velocity fields produced by limiting rotation of space mass and charge of electron are created (Fig. 5), and gravity, electric fields are produced. The magnetic field is concluded to be the conversion of the spatial velocity field itself when electron is in motion relative to space. Therefore these fields too cannot dissipate their field-strengths during interaction and are indestructible entities as long as the electron exists. During super-position of electric fields, as noticed in the creation of neutral state of matter when positive and negative charges meet, or when oppositely directed magnetic fields occupy the same region of space, the original-field strengths are restored when the initial conditions prior to the superposition are re-established.



ω = Angular velocity of spherical interface around y–y'

Void = Fieldless spherical hole in space

Space = Non–viscous, mobile, continuous, incompressible

Void–radius $r_e \simeq 10^{-11}$ cm

Charge on elemental ring surface(dq) = Ring area x Speed of circulating space on ring surface

$$dq = dA(\omega r_e \sin\theta)$$

Electronic charge $q_e = \int_0^{\pi} (2\pi r_e \sin\theta \, r_e d\theta)(\omega r_e \sin\theta)$

$$q_e = (\pi/4)(4\pi r_e^2 c)$$

Dimensions of q_e = Length^3/Time

Rest mass of elemental disc of void: dm = dv x Speed of circulating space at the interface of the element

$$dm = (\pi r_e^2 \sin^2\theta \, r_e d\theta)\, \omega r_e \sin\theta$$

Electronic rest mass $m_e = \int_0^{\pi} (\pi c r_e^3 \sin^3\theta \, d\theta) = (4\pi/3) r_e^3 c$

Dimensions of m_e = Length^4/Time

GENERATION OF MASS & CHARGE OF ELECTRON FROM ABSOLUTE VACUUM

Fig. 5.

Absence of Energy Exchange in Radiation (Light) Phenomenon

Due to motion of electron or if it is supposed to oscillate to and fro, a space point P will have different magnitudes of the fields there (Fig. 7) since the strength of the velocity field of the electron falls inversely as the distance from the electron's centre. The effect of decreasing field potentials trailing behind the electron as it moves, can be shown as electromagnetic (light) effect. The process of "readjustments" of the magnitudes of the fields in space as particles move or oscillate is seen as radiation, light, or heat-effect. There is no loss in strength of the velocity field or energy from the structure of electron due to radiation that is produced when it moves or is accelerated.

The flow of electric current causes electrons to jostle around atoms and thereby the kinetic energy of the moving electrons produces oscillations of the atoms within the conductor and results in "changes in the field potentials" of the atoms in their vicinity, spreading out at speed c also outside the conductor. As discussed before, the atoms of the conductor undergo successive changes from neutral to positive state and thus produce in their surroundings "changes in their field potentials" due to the gravity potential in neutral state changing into electromagnetic potential in positively charged state. These "changes in field potentials" as stated above have the effect of heat radiations, and here again the energy in the structure of the electrons and the atoms of the circuit conductor remains a constant quantity. (The mass-energy equation $E = mc^2$ is valid during the process of annihilation of electron and positron, and also during creation of these particles, but not in the process of vibrating atoms or acceleration of electrons due to which light is produced).

The "photons" produced in heat radiations are not energy entities as conventionally believed, but effects of "decreasing

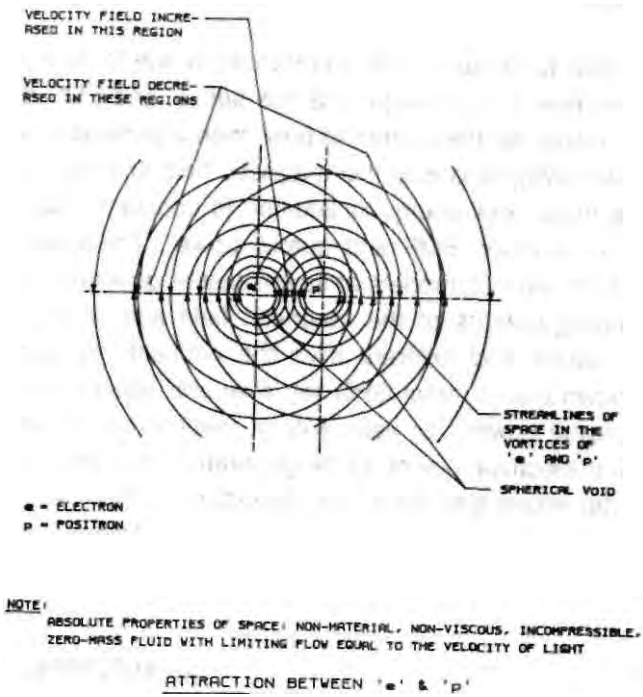

VELOCITY FIELD INCREASED IN THIS REGION
VELOCITY FIELD DECREASED IN THESE REGIONS
STREAMLINES OF SPACE IN THE VORTICES OF 'e' AND 'p'
SPHERICAL VOID
e = ELECTRON
p = POSITRON
NOTE:
ABSOLUTE PROPERTIES OF SPACE: NON-MATERIAL, NON-VISCOUS, INCOMPRESSIBLE, ZERO-MASS FLUID WITH LIMITING FLOW EQUAL TO THE VELOCITY OF LIGHT
ATTRACTION BETWEEN 'e' & 'p'

Fig. 6.

field potentials" of the vibrating atoms. Since a neutral atom say A during oscillations produces radiation pulses due to changes in its gravity potentials, the neighboring atom B also undergoes changes in its gravity potentials due to the radiation pulses from A, and in turn B produces radiation pulses of its own such that the pulses from B are opposite in phase to those from A, thereby helping in restoring the stability of A. Kinetic heat due to vibrations of atoms is a process that without exchange of energy from the structure of the atoms restores stability, or thermal equilibrium in the surrounding matter, and it is therefore that within a thermally closed system, all bodies come to the same temperature. The present concept of exchange of energy between bodies due to heat radiation fails when rigorously analysed taking note of the process of creation of matter from spatial reality.

Conclusion

If heat produced in the electric circuit due to its resistance to current flow is not energy in a true sense, and EMF does not require energy for the current to flow, then a generator designed with new configurations of the magnetic field and the conductor will take much less energy in addition to constant magnetic excitation to produce EMF and output power. The experimental results from various models of space power generator (SPG) in which configurations of the magnetic field and conductor discussed earlier and different from the conventional generators have shown that in motor-SPG set, over and above the windage and frictional power, for each KW of mechanical power, about 2.5 KW of electrical power an be generated, thus providing support to the above theoretical considerations. It also gets evident that there exists the possibility for a highly efficient free power machine that will make perpetual system possible.

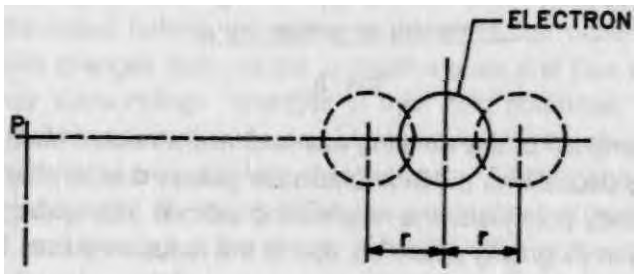


Fig. 7.

CHAPTER 8

LIMITATION OF THE LAW OF ENERGY CONSERVATION

Abstract

Experimental results from a new system of electrical power generation in which energy output exceeds energy input are given. An alternative theory shows that basically it is the spatial reality that creates cosmic matter and therefore the energy conservation law primarily is applicable to the universe as a whole. Discrepancies in the energy conservation law will arise in all those phenomena where spatial energy fields in atomic structure are not taken into account.

Introduction

The law of conservation of energy is today an accepted doctrine that governs all energy-exchange phenomena of nature. The impossibility of perpetual motion follows from this very law.

When a neutron within a nucleus undergoes beta-decay splitting into an electron and a proton, the mass of the neutron exceeds the combined mass of the electron and proton. As per mass-energy equation, $E=mc^2$, the mass-deficit should appear in the kinetic energy of the decay products. Accurate measurements, however, showed that the electron and proton carried less kinetic energy. At that stage (1931) when the law of conservation of energy was threatened, the existence of a new particle (neutrino), till then unknown, was postulated to save the law. The particle predicted had to be neutral so that "charge conservation" is also applicable to the process because the

decay products, proton and electron from the neutral neutron, carry positive and negative unit charges respectively. The above shows the rigidity with which, presently, the energy conservation law is adhered to even in quantum phenomena.

The results of certain experiments in recent years involving electromagnetic induction effect, described further in this article, are in violation of the conservation iaw of energy. A deeper analysis of the fundamental state of energy that can create stable matter, and energy-exchange between electron/atom and electromagnetic radiation are carried out through an alternative theory proposed in author's works [1,2] that reveals the reasons for the apparent failure of the conservation law in the above mentioned experiment, and also the major digressions from reality that seem to have been made by the 20th century physics.

Space Power Generation

A rotating system of electromagnet and conductors is shown in Fig-1. The conductor A develops positive voltage with respect to the shaft due to its rotation with the magnetic field B, while the other conductor A1 develops zero voltage due to magnetic field B being in opposite directions in the upper and lower half of the conductor. Though the electromagnet producing the field B along with its iron core and the conductors A and A1 form a co- rotating system, yet voltages are induced in the conductors as discussed elsewhere [3]. The rotation of the machine is achieved with a variable speed dc drive motor (DM) which can be kept at constant speed during the no-load and the load tests of the generator (Space Power Generator, abbreviated as SPG). The test results obtained during the recent tests on the SPG are shown in Table-1. Against an input of 6975 watts dc to DM, the electrical dc output measured through shunt at the terminals of SPG is 7584 watts, despite the fact that 3105 watts of power is consumed towards windage and friction of the DM-SPG set running at 3413 rpm. The energy-balance shows that

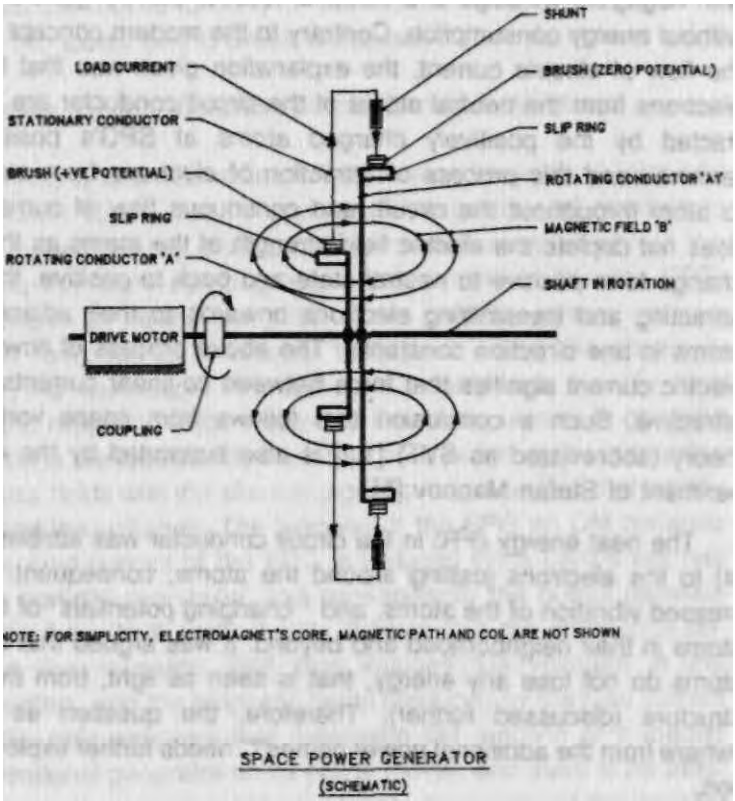


Fig. 1.

the output exceeds input by 3690 watts, which is in violation of the law of conservation of energy in this specific experiment involving electro-magnetic induction effect.

Source of Additional Power

The flow of electrons in the load current from the SPG was explained in an article " Genesis of Free Power Generation" [4]

to be not due to the energy from the electromotive force (EMF), because, as argued in that article, the EMF, in an ideal generator with negligible windage and frictional losses, can be generated without energy consumption. Contrary to the modern concept on the flow of electric current, the explanation given was that the electrons from the neutral atoms of the circuit conductor are attracted by the positively charged atoms at SPG's positive terminal, and this process of attraction of electrons from atom to atom throughout the circuit, and continuous flow of current, does not deplete the electric field strength of the atoms as they change form positive to neutral state and back to positive, thus attracting and transmitting electrons onwards to their adjacent atoms in one direction constantly. The above process of flow of electric current signifies that force between co-linear currents is attractive. Such a conclusion that follows from space vortex theory (abbreviated as SVT) [1,2] is also supported by the experiment of Stefan Marinov [5].

The heat energy (I^2R) in the circuit conductor was attributed [4] to the electrons jostling around the atoms, consequent increased vibration of the atoms, and " changing potentials" of the atoms in their neighborhood and beyond. It was argued that the atoms do not lose any energy, that is seen as light, from their structure (discussed further). Therefore, the question as to "where from the additional power comes?" needs further exploration.

A deeper analysis [1,2] of the structure of electron and atoms shows that the basic state of energy constituting electrons and atoms is an indestructible entity (produced due to dynamics of absolute vacuum, discussed further) that can not be " emitted" by the particles or the fields associated with the particles during their oscillations or acceleration. Just as gravity field of earth can be said to produce energy through a system of bodies under free-fall, and without reduction of earth's gravity field strength, so also the atoms in a conductor during current flow produce heat without loss of energy form their structure. In any case, the

source of the additional power is the "circuit conductor" and not the SPG, since after the creation of the EMF at the SPG's terminals, the motive force[4] for the electrons was shown to come from the atoms of the circuit conductor.

Reasons for the Violation of the Conservation Law

In the article "Genesis of Free Power Generation" [4] it had also been stated that by appropriate disposition of conductors with respect to the magnetic field, and close proximity of the circuits that carry outgoing and return currents within the SPG, the effects of Lenz's law (that follows from the energy conservation law) can be overcome to a good extent. As shown in Fig-1, the conductors A and A_1 are located side by side such that the magnetic fields created due to their currents in opposite directions are appreciably canceled, thus reducing the interaction of these fields with the electromagnet's magnetic field that initially induced the voltages. The reaction of the SPG on DM because of the load current of the SPG is reduced since Lenz's law has been partially overcome, and consequently the output exceeds the input by 3690 watts. It gets evident that the interaction between the magnetic field that induces the voltages in the conductors, and the magnetic fields produced by the load current are the only agencies that determine the reaction of a loaded conventional generator on its prime mover, and there is no other mechanism operating within the generator to ensure the equality of output with input, as required by the energy conservation law.

The new finding of the fact that the output exceeds the input in the above experiment can not be explained by the contemporary physics which, while recognizing matter and its fields as reality, considers space (without fields and matter) as empty extension. In author's view, a broader concept (discussed below) that reveals the fundamental nature of space, matter, energy, and their inter-relationships, is required to pinpoint the reasons

*For complete discussions refer to author's works 'Beyond Mater' [1]

due to which the results of the above experiments become inexplicable by the current physics.

Structure of Electron

The classical physics proposed that electron is a "spherical ball" of unit charge, and its radius can be expressed as $r_e = e^2/m_e c^2$, where $e^2 = q_e^2/4\pi\varepsilon_0$ in which q_e is the electron's charge m_e is electron's mass, e_0 is the dielectric constant of the absolute vacuum, and c is the speed of light in absolute vacuum. It has been postulated in author's works [1,2] that electron is a "vortex of vacuum" with absolute "nonmaterial" properties of "masslessness", "continuity", 'zeroviscosity", and "fluidity" (Fig.2a) with a central spherical void of fixed radius r_e within which the flow of the absolute vacuum (hereafter, referred as "space") is broken down* due to its circulation at speed of light, the expressions for q_e and m_e derived from the vortex structure of electron are : $m_e = (4\pi/3) r_e^3 c$ and $q_e = (\pi/4)\ 4\pi\ r_e^2 c$. Also, in the above works[2] it has been shown that $\varepsilon_0 = \pi/2c$. Substituting these values of q_e, m_e and ε_0 (that are expressed in terms of r_e and c) in the expressions of classical electron radius, we have,

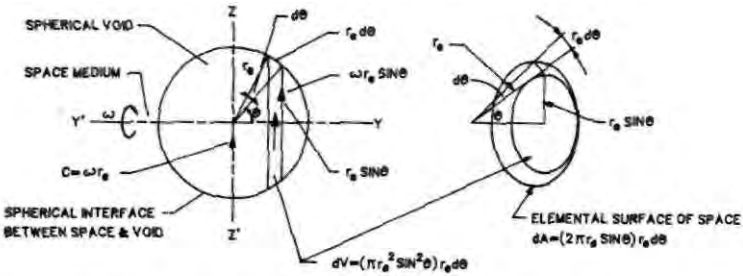
$$e_0 = e^2/m_e c^2$$

$$= (q_e^2/4\pi\varepsilon_0)/m_e c^2$$

$$= [(\pi/4)\ 4\pi\ r_e^2\ c]^2/4\pi\ (\pi/2c)]/(4\pi/3)\ r_e^3\ c\ c^2$$

$$= 3\pi\ r_e/8 \sim r_e,$$

which shows that the relationship of electron's charge and electron's mass derived through alternate theory (SVT) vindicates the classical physics on its proposition of spherical model of electron and the expression for the classical electron radius, though the spherical void at the electron center, and nonmaterial properties of space, are additional features of SVT.



CHARGE ON ELEMENTAL RING SURFACE dq = RING AREA x SPEED OF CIRCULATING SPACE ON RING SURFACE

$$= (dA\, \omega r_e \sin\theta)$$

ELECTRONIC CHARGE $$q_e = \int_0^{\pi} (2\pi r_e \sin\theta\, r_e d\theta)(\omega r_e \sin\theta)$$

$$= (\pi/4)(4\pi r_e^2 c)$$

DIMENSIONS OF q_e : LENGTH^3/TIME

REST MASS OF ELEMENTAL DISC OF VOID

dm = dV x SPEED OF CIRCULATING SPACE AT THE "INTERFACE" OF THE ELEMENT

$$= (\pi r_e^2 \sin^2\theta\, r_e d\theta)\, \omega r_e \sin\theta$$

ELECTRONIC REST MASS $$m_e = \int_0^{\pi} (\pi c r_e^3 \sin^3\theta\, d\theta) = (4\pi/3) r_e^3 c$$

DIMENSIONS OF m_e : LENGTH^4/TIME

ANGULAR MOMENTUM 'L'

$$dL = dm(\omega r_e \sin\theta)\, r_e \sin\theta$$

$$L = \int_0^{\pi} \pi r_e^4 \omega^2 \sin^3\theta\, d\theta = (4/5) m_e c r_e$$

ω: ANGULAR VELOCITY OF SHPERICAL INTERFACE AROUND Y–Y'

VOID : FIELDLESS SPHERICAL HOLE IN SPACE

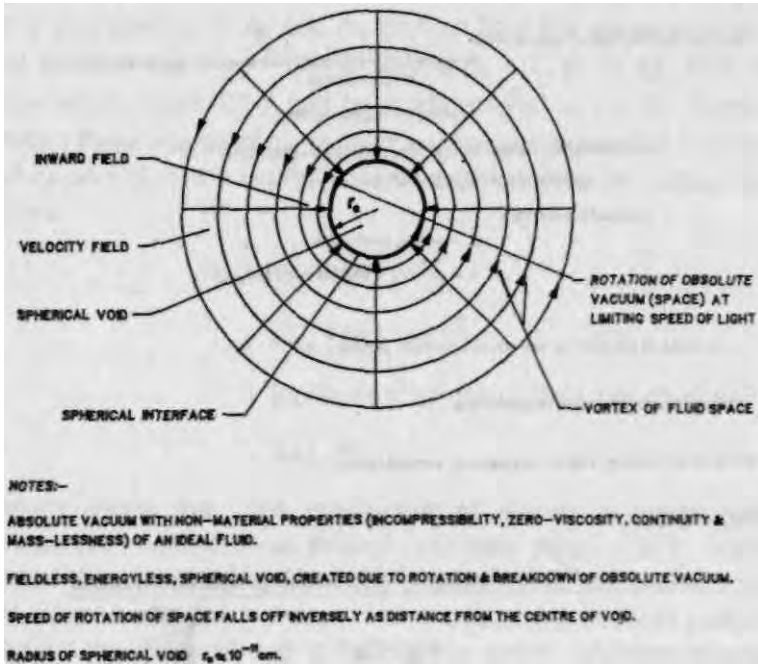
SPACE : NON–VISCOUS, MOBILE, CONTINUOUS, INCOMPRESSIBLE

VOID RADIUS $r_e \approx 10^{-11}$ cm

GENERATION OF MASS & CHARGE OF ELECTRON FROM ABSOLUTE VACUUM

Fig. 2a.

The spherical void (hole) in dynamic space at the centre of electron removes the difficulty [2] of "infinite energy" in the field of electron (considered presently as point charge) since the energy distribution starts from the spherical space-viod interface at radius r_e, and not from the void centre; the energy within the void being zero or negative, relatively speaking. The spherical void also reverses the direction of the vectors of the fields associated with the electron [Fig.2b]. The electron (uninteracted with any matter or field) is held stationary due to his own inward radial forces arising out of its dynamically stable structure [1,2,4] of eternally spinning space at the highest possible speed c at void-space interface, making it exhibit the behaviour of a "hard shell" for outside interactions, and spatial reality (velocity field due to space rotation) extending in the entire universe. The motion of electron in space due to its void-vortex structure exhibits


INWARD FIELD
VELOCITY FIELD
SPHERICAL VOID
SPHERICAL INTERFACE
ROTATION OF OBSOLUTE VACUUM (SPACE) AT LIMITING SPEED OF LIGHT
VORTEX OF FLUID SPACE
NOTES:-
ABSOLUTE VACUUM WITH NON-MATERIAL PROPERTIES (INCOMPRESSIBILITY, ZERO-VISCOSITY, CONTINUITY & MASS-LESSNESS) OF AN IDEAL FLUID.
FIELDLESS, ENERGYLESS, SPHERICAL VOID, CREATED DUE TO ROTATION & BREAKDOWN OF OBSOLUTE VACUUM.
SPEED OF ROTATION OF SPACE FALLS OFF INVERSELY AS DISTANCE FROM THE CENTRE OF VOID.
RADIUS OF SPHERICAL VOID $r_e \approx 10^{-13}$ cm.

ELECTRON STRUCTURE

Fig. 2b.

inertia, momentum and kinetic energy as derived in "Beyond Matter" [2]. the energy of creation is computed [2] as $m_e c_2$ which conforms to Einstein's mass-energy equation. Also, annihilation of electron and positron [2] is physically possible to be achieved due to reduction of "space spin" and resultant collapse of the central void when the particles due to attraction are superposed on each other. Any displacement given to a single electron (removed from all matter and fields) is opposed by its own inward forces on its spherical interface as stated above.

Radiation form Electron

Modern physics considers emission of energy in the form of light (photons) from an electron in oscillation or acceleration. If an electron is set in oscillations, it eventually comes to rest, and "how else the stoppage of oscillating movements is possible if energy is not emitted from it as photons" is the argument generally given. It was also the prediction of classical electromagnetic theory that an electron orbiting around nucleus will eventually fall on to the nucleus. The spherical void at the centre of electron in SVT, as stated earlier, has negative energy, and hence it can not emit any positive energy (photons) from within. Also, no entity can penetrate the interface spinning at speed of light. Therefore, the electron has structural limitation in absorbing any energy within. For the structure of the electron to remain stable, the energy of the spatial spin has to be constant. The production (not emission) of light is an effect [1,3] produced due to decay of the potential (gravitational and electromagnetic) of the electron under annihilation that initiates at its spherical void and transmits into the whole universe (Fig.3b). There can be no exchange of energy between the electron and the "light effect" produced due to its oscillation or acceleration in the atomic orbit. The stoppage of electron's oscillations, mentioned earlier, is due to the inward nature of fields on electrons's spherical interface and not on account of loss of energy by emission of photons as presently believed.

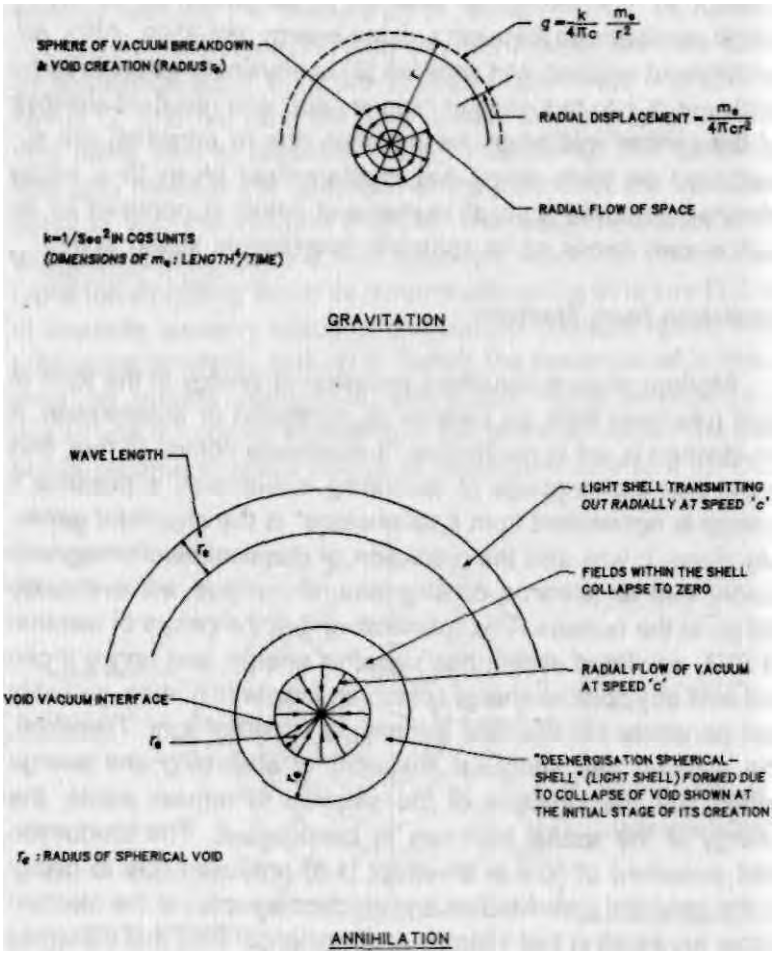
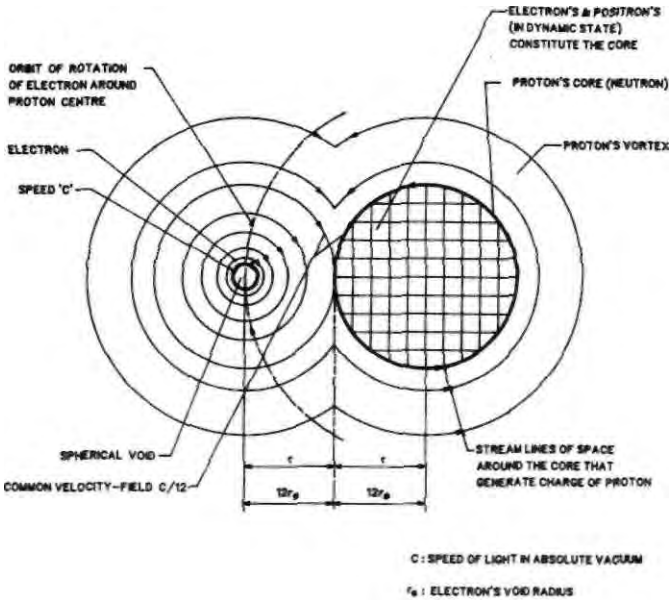

SPHERE OF VACUUM BREAKDOWN & VOID CREATION (RADIUS r_0)
$g = \frac{k}{4\pi c} \frac{m_e}{r^2}$
RADIAL DISPLACEMENT = $\frac{m_e}{4\pi cr^2}$
RADIAL FLOW OF SPACE
$k = 1/Sec^2$ IN CGS UNITS
(DIMENSIONS OF m_e : LENGTH^4/TIME)
GRAVITATION
WAVE LENGTH
LIGHT SHELL TRANSMITTING OUT RADIALLY AT SPEED 'c'
FIELDS WITHIN THE SHELL COLLAPSE TO ZERO
RADIAL FLOW OF VACUUM AT SPEED 'c'
VOID VACUUM INTERFACE
"DEENERGISATION SPHERICAL-SHELL" (LIGHT SHELL) FORMED DUE TO COLLAPSE OF VOID SHOWN AT THE INITIAL STAGE OF ITS CREATION
r_0 : RADIUS OF SPHERICAL VOID
ANNIHILATION

Fig. 3.

Atomic Structure

In SVT, the existence of only one fundamental particle, that is, electron, follows from the postulates that the universe is constructed of only one non-material entity (space) with the limiting speed of its flow, c. The positron is shown [1,2] to be an oppositely spinning electron, and thus the idea of positive and negative charge is a relative concept. The electrons, through the interactions of velocity fields, repel each other electrically and attract magnetically when in motion. Also, an electron attracts positron electrically and repels magnetically when in motion. With such forces of interaction between these particles, an electron and a positron in dynamic state will magnetically repel without annihilating each other, and, as shown in Fig.4, can assemble



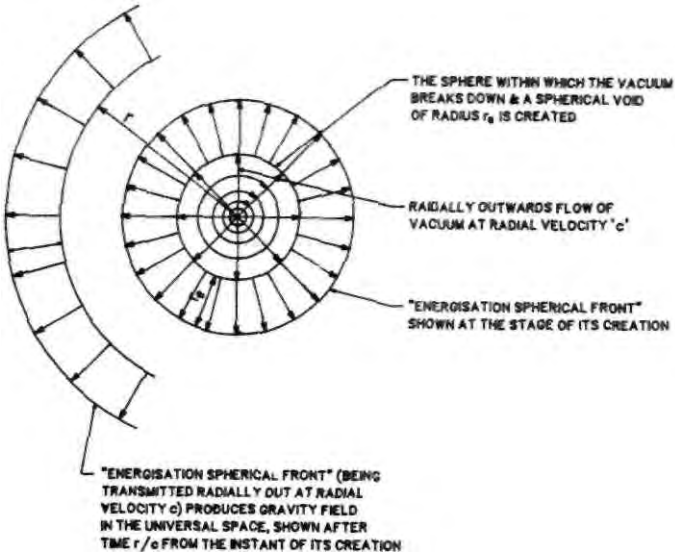
HYDROGEN ATOM

Fig.4.

into a neutron, which as per SVT, is the core of Hydrogen atom. When the neutron assembled out of 1836 numbers of electrons (918 of them are positrons) is enclosed within a space vortex, its stability increases as it develops electric charge due to "space spin" around it and becomes a proton. When a proton attracts an electron through the interaction of the velocity fields in their vortices, hydrogen atom is built (Fig. 4). The spacing between the centres of the orbiting electron and the proton is determined by the common velocity-field at the spinning surface of proton. The velocity fields of electron being (relatively) oppositely oriented with the proton's velocity fields, the hydrogen atom behaves neutral to outside interactions.

The atomic structure of hydrogen, described above, shows that the region around the nucleus is the vortex of space with speed of space rotation of (c/12) around the nucleus, and falling inversely as the distance from the centre. The bond between the electron and proton is provided by the common velocity-field between these particles which occurs at the interspacing of $24r_e$, and thus the electron will have electrical attraction with the proton and also a fixed orbit, with no possibility of its falling on to the nucleus, since, the zero-viscosity space circulating within the vortex, does not reduce its velocity field with time. The size of the atom is determined by the volume of the nucleus which, in this case, is neutron assembled out of 1836 electrons. With this vortex structure, the atom too, like electron, has no possibility of either emitting or absorbing energy except for kinetic energy which is associated [1,2] with it when in motion relative to space.

For the atoms heavier than hydrogen [2], the nuclei contain half electrons and half positrons to account for the nuclear mass of different atoms, the velocity fields of the spatial-spin around the nucleus determines the charge around the nucleus, and the numbers of electrons orbiting around the nucleus are fixed so as to bring overall neutrality of the atoms in normal state.


THE SPHERE WITHIN WHICH THE VACUUM BREAKS DOWN & A SPHERICAL VOID OF RADIUS r_e IS CREATED
RADIALLY OUTWARDS FLOW OF VACUUM AT RADIAL VELOCITY 'c'
"ENERGISATION SPHERICAL FRONT" SHOWN AT THE STAGE OF ITS CREATION
"ENERGISATION SPHERICAL FRONT" (BEING TRANSMITTED RADIALLY OUT AT RADIAL VELOCITY c) PRODUCES GRAVITY FIELD IN THE UNIVERSAL SPACE, SHOWN AFTER TIME r/c FROM THE INSTANT OF ITS CREATION

Creation of Electron Fig. 5.

Gravitation and Light

The creation of the spherical void of electron energises the whole universal space by producing [1,2] gravitational and also electric field* (Fig. 3a, Fig.5) in the space of the universe. The angular momentum of electron (Fig.2a) due to spin of its interface and computed as, (4/5) m_e cr_e, with the use of the mass and charge equations derived in SVT, is concluded to be the plank's constant in its basic form, and applicable to the fundamental particle, electron. During the process of annihilation, the angular momentum of electron reduces to zero in time duration r_e/c

Derivation of electric field from velocity field is discussed in Beyond Matter [2]

releasing energy (4/5) $m_e c r_e/(r_e/c)$, that is, (4/5) $m_e c^2$, which flows into the void under the process of collapse, simultaneously, a spherical shell (Fig.3b) of negative energy" [2] is initiated from the interface transmitting out in space at speed c, and seen as a pulse of light. In the above process of annihilation, the frequency of light is identified as the inverses of the duration of the pulse formation, that is, $1/(r_e/c)$, and the wave length of light as r_e. It is also shown [2] that the energy released at the interface, given above, is:

$$E = (4/5)m_e c^2$$

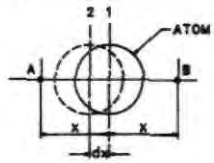
$$= (4/5)\ m_e\ cr_e/(r_e/c)$$

$$= (4/5)\ m_e\ cr_e\ (c/r_e)$$

$$= hf$$

where, as stated above, (4/5) m_e cr_e, is the Planck's constant for electron and (c/r_e) is the frequency f. The conclusion is that the decaying potentials (gravitational, electromagnetic) of electron in space or deenergisation of the universal space due to the collapse of the void during annihilation, produces light effect. The reduction to zero of the velocity field in space associated with the electron during its existence, due to annihilation, creates magnetic field, whereas, the radial flow of fluid space into the void (Fig. 3b) creates the electric field within the light shell produced in annihilation process. In case of atoms, that are neutral, only the gravity field of the atoms exists in space (since the velocity fields of the orbital electrons and the nucleus being opposite in directions cancel each other) and therefore, the light shell produced due to oscillations of atoms has only "changing gravity potential" (Fig. 6a, Fig. 6b) that creates electromagnetic field within the wavelength of the light shell.

**Reason for the light-shell to have negative energy is discussed in Beyond Matter [2]

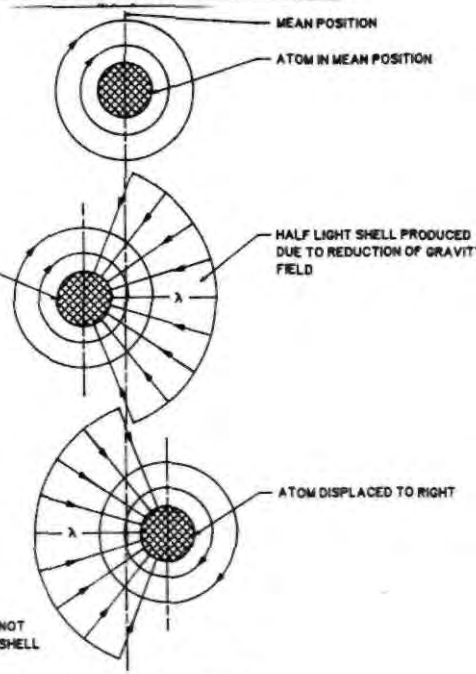


G : GRAVITATIONAL CONSTANT
m_a : atomic mass

1. WHEN ATOMIC CENTRE IS AT POSITION 1, INWARD GRAVITY FIELD AT 'A' & 'B' ARE Gm_a/x^2

2. WHEN ATOM MOVES TO POSITION 2, INWARD GRAVITY FIELD AT 'A', WILL BE $Gm_a/(x-dx)^2$, & AT 'B', $Gm_a/(x+dx)^2$. THE CHANGE IN FIELDS WILL TAKE PLACE AFTER A TIME x/a, FROM THE INSTANT ATOM MOVES TOWARDS 'A'. THE REDUCTION OF GRAVITY FIELD AT 'B', WILL RESULT AS LIGHT EFFECT AT 'B'.

GRAVITY FIELD VARIATION DUE TO OSCILLATION



ATOMIC OSCILLATION IN A PLANE DOES NOT PRODUCE SPHERICALLY SYMMETRICAL SHELL

LIGHT FROM ATOMIC VIBRATION

Fig. 6a & 6b.

The Planck's constant for an atom under oscillation has been derived [2] with the "time rate of change of gravitational potential energy" at the spherical nuclear surface of the atom. It is shown that Planck's constant for atoms is different for each atom, and also different for electron (though with slight variations). Further, it is seen that Planck's constant is directly proportional to the square of the mass, and inversely proportional to the radius of the atom [1], which is against the very basic concept of quantum theory that rests on the premise that Planck's constant is an universal constant. Also, with light effect consisting of successive shells of energy (depleted energy shells, more precisely), such that the frequency of light is determined by the number of shells produced by an oscillating atom per unit time [2.6], Planck's constant has physical significance of energy quantum contained in only one shell as shown below.

If N shells of light (of frequency f) are produced in unit time (say, second) from an oscillating atom, then from Planck's energy equation,

$E = hf = h\ (N/sec)\ E/N = h/sec = 6.62 \times 10^{-27}$ erg in CGS units,

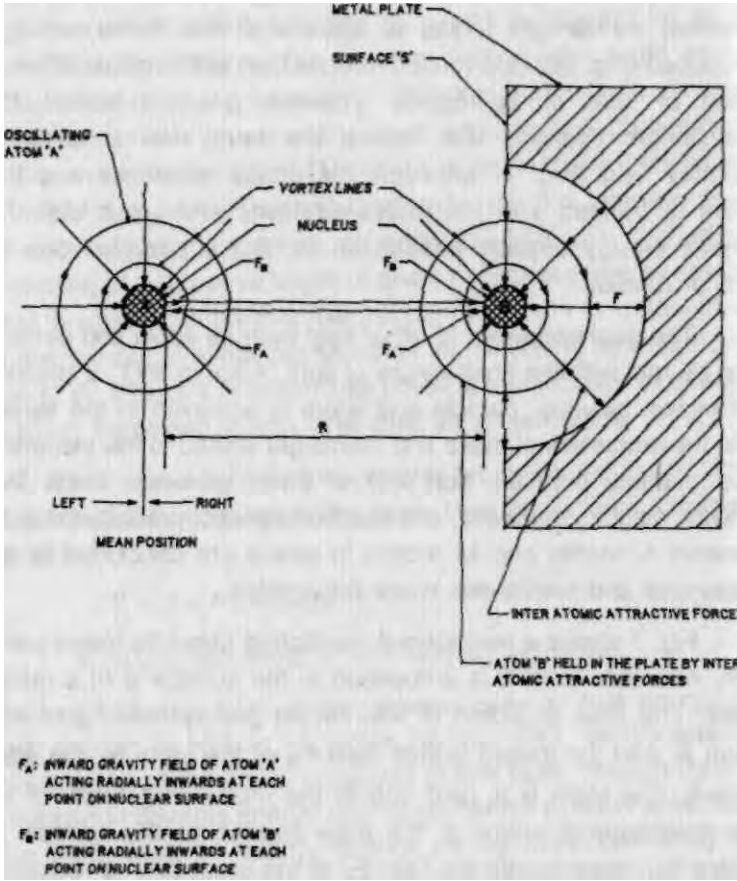
whereas, different from above, modern view is that energy of each photon of light is hf, which, as per SVT, is the energy contained in all the shells produced in unit time. Though light is produced in discrete energy quanta contained in each shell, and also transmitted as energy quanta (in the individual shell) as suggested by Einstein, the quanta of energy as concluded above is not "hf" but "h/sec" in CGS units.

In the explanation for photo-electric effect, the kinetic energy of the ejected electrons should be derived from the inherent rotation of the orbital electrons in the atomic vortex, and not from the energy absorption by the photo-electrons from the photons of light as now conventionally believed. The threshold frequency for photo-emission can be determined by the gradient across the

wavelength of the "changing gravity potential" [2] which is higher for shorter wavelengths, that is, higher frequency. The highest gradient of the "gravity potential changes" occurs across the shortest wavelength (equal to electron's void radius) of light produced (Fig. 3b) due to electron-positron annihilation. When a shell of light of appropriate potential gradient across the wavelength interacts with atoms, the bond due to common velocity field (Fig. 4) between the orbital electrons and the atom is broken, and the photo-electrons shoot out with the kinetic energy already possessed by these particles due to orbital rotation.

The dual behaviour [2, 6] of light both as wave and particle can be met with the shell-nature of light. Also, in SVT, a sharper distinction between particle and wave is achieved in the sense that the properties of mass and inertia get limited to the electrons and material particles built out of them whereas, fields like gravity, electric, magnetic, and electromagnetic, produced due to creation of matter and its motion in space are concluded to be mass-less and inertia-less wave-like entities.

Fig. 7 shows a free atom A oscillating about its mean position, whereas, atom B is embedded in the surface S of a metal plate. The lines of action of the inward gravity field F_A of the atom A, and the inward gravity field F_B of the atom B, are also shown. The atom B is held due to the interatomic forces F of the neighbouring atoms in the plate except on the surface S where F_A interacts with the field F_B of the atom B. The resultant gravity field $F_B - F_A$ acts at atom B on the plate's surface S. With the oscillation of atom A, when it is displaced towards left, a light pulse as described earlier starts from A, and after a time R/c, reaches S decreasing the strength of the field F_A, thereby increasing the magnitude of $F_B - F_A$, which results in a net force on B arisen because of its own inward gravity field F_B. During the next displacement towards right, through a similar process



ELECTROMAGNETIC INTERACTION BETWEEN ATOMS

as described above, the magnitude of F_A increases (as A comes closer to B) which decreases the magnitude $F_B - F_A$, and leads to the reduction of force on the atom B. The intermittent pressure impulses on atom B, which is held embedded in the surface S by the interatomic forces F, set it under oscillation, creating electromagnetic pulses also from the atom B. It is thus seen that the atom A, Without imparting momentum to atom B with direct contact, sets it in oscillation through the light pulses produced due to its mechanical oscillations.

Since in a neutral atom the velocity fields in the vortices of the orbital electrons and the central nucleus cancel each other, the electromagnetic field of the electrons (arising due to their structural vortices) confined within the atom is not the agency to produce light (electromagnetic wave) from an atom under oscillation. As concluded earlier, the changes in the gravity potential of the oscillating neutral atom produce light, and therefore, the phenomenon of light is an effect of Galilean relativity in the sense that during oscillation, to and fro displacement of atom relative to space produces light.

Conclusion

The electron in its structure has symmetrical distribution of velocity field around its void centre as shown in Fig. 2a and Fig. 2b. The velocity field of an electron, when it is in motion relative to space, is converted to magnetic field [1,2]. During the interaction of the electromagnetic field of a moving electron with external fields, that may be electric or magnetic in nature, the symmetrical distribution of the field of electron in its structure change, due to which it moves under the action of the resultant field acting inwards on its interface till normalcy is achieved, that is, till the symmetry of the fields around the void is restored. After stability has reached and the motion of electron has ceased, the field strengths of the external field and also the structural field of electron remain unaltered, thus showing that the

electron, as a system of fields, has not lost any energy during above interactions.

The exchange of energy between two material systems can, however, take place due to impact between two electrons in relative motion on account of transfer of additional velocity field (that determines momentum) [2] associated with the linear motion of electron moving at higher velocity to the electron at lower velocity. Here again the velocity field in the vortex structure of electrons remain unchanged since the fields (and matter), due to their construction by non-material space medium with absolute properties, are permanent (indestructible) entities.

During the flow of electric current, the orbital electrons of the atoms of the conductor in electric generators interact with the external magnetic field during the induction of EMF at no-load condition, and create positive and negative polarities due to motion of electrons towards one of the ends of the conductor without expenditure of any energy from the magnetic field system or depletion of the magnetic field strength. The atoms of the circuit conductor changing from neutral to positive in succession and transmitting electrons (current), as explained earlier, do not undergo any reduction of the velocity field in their vortices, and thus keep the structural energy constant. Therefore, to the extent Lenz's law can be overcome by suitable disposition of the conductor and magnetic-field system as discussed before, output electrical power greater than the input can be generated. However, when the spatial reality of fields and absence of energy at electron's centre are recognized, the law of conservation of energy becomes applicable only to the universe as a whole, though for the phenomena involving material interactions due to conservation of momentum, the energy conservation law will be valid also in isolated systems.

The electron as point-charge, and the assumption that it "absorbs" energy and also "gives off" energy during acceleration are misconceptions that have hindered development of theory

on atomic structure in right direction. Further, non-recognition of the spatial field around the atomic nucleus (Fig. 4) due to which orbital electrons keep fixed orbits and rotate at high speed (nearly one tenth of speed of light in case of Hydrogen atom) has complicated explanation for the kinetic energy of the electrons emitted in photoelectric phenomenon and has led to the misunderstanding of the nature of Plank's constant. Einstein believed a single photon's energy to be "hf" perhaps to account for the kinetic energy of the emitted electrons together with the "work function". It, however, turns out that in GGS unit the energy of a single photon should be, "h/sec', and not "hf" which reduces the photon energy (producing photo-electron) by about 10^{14} times. The photon model as a "shell", and spatial energy as velocity field in atomic vortices, provide solution to the above problem as well as dilemma on dual behavior (wave-particle) of light.

The structures of electron, proton and atoms are "perpetually rotating system" at the very basic level of the universe. The universal space(absolute vacuum) itself is the most fundamental dynamic plenum. Therefore, achieving "perpetual motion" through electromagnetic machines is a total future possibility, since the ratio of energy output/energy input has already exceeded unity.

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OVERALL ENERGY BALANCE

SI. No.	Input Power (Watts)		Output Power (Watts)	
I	Magnetic excitation	648	Heat (i^2 r) from electromagnet	648
II	Drive motor on No-load	3105	Heat Due to windage & friction	3105
ill	Drive motor on -load	6975	Heat (I^2 R) from SPG	7584
IV	Increase due to load	3870		
V	Total Input (I) + (III)	7623	Total Output	11337

OUTPUT EXCEEDS INPUT BY 3690 WATTS

Speed of rotation :	3413 rpm	Over and above constant windage and frictional
Magnetic excitation :	18A	
Resistance of the electromagnet :	2 ohms	losses, efficiency of power generation 230%
EMF of SPG:	2.412 V dc	
Load current :	3144 A	
Combined efficiency of drive-motor and belt drive:	0.85	

CHARGE ON ELEMENTAL RING SURFACE dq = RING AREA x SPEED of CIRCULATING SPACE ON RING SURFACE

$$= (dA\omega r_e \, SIN\theta)$$

ELECTRONIC CHARGE

$$q_e = \int_0^{\pi} (2\pi r_e \, SIN\theta \; r_e \, d\theta)(\omega r_e \, SIN\theta)$$

$$= (\pi/4)(4\pi r_e^2 \, c)$$

DIMENSIONS OF q_e : LENGTH^3/TIME

REST MASS OF ELEMENTAL DISC OF VOID

dm = dV x SPEED OF CIRCULATING SPACE AT THE "INTERFACE" OF THE ELEMENT

$$= (\pi r_e^2 \, SIN^2\theta \; r_e \, d\theta) \, \omega r_e \, SIN\theta$$

ELECTRONIC REST MASS

$$m_e = \int_0^{\pi} (\pi c r_e^3 \, SIN^3\theta \, d\theta) = (4\pi/3) \, r_e^3 \, c$$

DIMENSIONS OF m_e : LENGTH^4/TIME ANGULAR

MOMENTUM V

$$dL = dm \, (\omega r_e \, SIN\theta) \, r_e \, SIN\theta$$

$$L = \int_0^{\pi} \pi r_e^4 \, c^2 \, SIN^5\theta \, d\theta = (4/5) \, m_e \, c r_e$$

ω : ANGULAR VELOCITY OF SPHERICAL INTERFACE AROUND Y-Y'

VOID: FIELDLESS SPHERICAL HOLE IN SPACE

SPACE: NON-VISCOUS, MOBILE, CONTINUOUS, INCOMPRESSIBLE

VOID RADIUS $r_e \sim 10^{-11}$ cm

GENERATION OF MASS & CHARGE OF ELECTRON FROM ABSOLUTE VACUUM

Epilogue

Space is the most subtle substratum. Its properties of supermobility, continuity, isotrophy and homogeneity remain completely unchanged even when the gravitational and electromagnetic fields approaching the highest intensity pervade it, except for the loss of continuity due to its breakdown at the limiting angular velocity and flow. The human experiences are restricted by the senses to only low velocity effects. Even the atmospheric air is not cognised by the senses unless the wind blows and the effect is inferred, it is the process of inference through experiments with the scientific apparatus (that extends the limit of the sense perception), or through theoretical analysis and interpretations that provide scientific knowledge of nature. Through experiments, the grosser aspects of nature like the behaviour of matter of our day to day experience and also the quantum particles can be studied, whereas, the extreme subtility of space and its properties unlike matter, leave the process of inference alone for its basic study. The deeper the analysis into the heart of matter, the subtler become the arguments, but at no stage the subtility should overshadow sensibility, simplicity, and comprehensibility. The flash of intuition generated due to persistent thought process exploring a phenomenon is the final regulating element that determines the direction wherever conflicts between the subtility of arguments and sensibility of its application arise. The present stage of our scientific understanding of space, matter and their relationships leave so much of unknown areas that multi-directional flights of imagination, unconventional though they may seem at first, are the right recourse, so as to discover some new fundamental relationships that explain the origin of the presently known numerous universal constants and their interdependence. There are enough evidences exhibited in nature's working mechanism showing convergence towards a universal whole, and in such a world of

basic unity how could there be more than one fundamental constant? Working with only one universal constant on the maximum angular velocity of space demonstrates that the theory proposed here is nearest to the truth, despite the fact that the idea of non-material space and voidness of fundamental matter, may give some garb of speculativeness.